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Engineering News-Record

IN THIS ISSUE:

Twin Cableways of Long Span for Norris Dam

Advice to Contractors Entering Government Work—VI

Driving a Water Tunnel Under the Continental Divide

Creating a Tertiary Road System by Town Aid

Groundwater Cutoff Wall Provides New Water Supply

Concrete Columns Encased in Steel Shells

Report of the Meeting of the Highway Research Board

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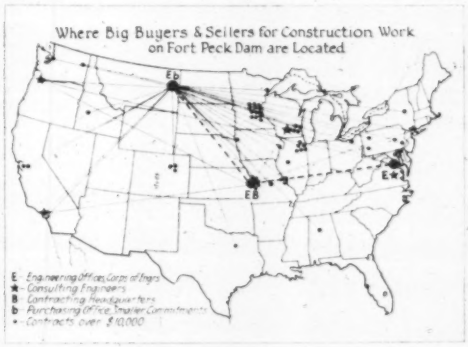
The Army *Behind the Lines*

THE October-November issue of *Engineering Construction Markets* offers an interesting commentary on the far-reaching influence of a large construction enterprise. It analyzes the purchasing influences and the distribution of the various major and subsidiary contracts thus far awarded for the construction of the Fort Peck Dam, the largest perhaps, of the current public works projects.


Where Big Buyers & Sellers for Construction Work on Fort Peck Dam are Located
E - Engineering Offices, Corps of Engrs.
★ - Consulting Engineers
B - Contracting Headquarters
b - Purchasing Office, Supplier Concentration
• - Contracts over $10,000

The dam itself is located in Montana, the engineers who are responsible for its design and construction are located not only at the site but also in Washington and Kansas City with additional consultants in New York, Los Angeles, Portland, Ore., and Madison, Wis. Contracting headquarters are in Kansas City, and some sixty subcontracts of more than $10,000 each have been awarded to contractors in fifteen states as far from the job as New York, Pennsylvania, Alabama, Texas, California and Washington.

Few construction projects ever have equalled either the magnitude or diversity of this great undertaking; yet it is but typical of thousands of smaller jobs with respect to its far-flung influence, diversity of employment and multiplicity of specifying, approving, recommending and purchasing influences. Every construction job, whether great or small, sets in motion far-ranging ripples of business activity that often carry employment and profit to distant and unexpectant shores.

In another respect also, Fort Peck Dam is a type case. Like the construction industry of which it is a part, it embodies in itself a vast variety of engineering works: the dam itself, a railroad, bridges, highways, tunnels, dredging, a town with its water supply, streets and sewers, electric substations and distribution system and gas supply. Here on one job is a cross-section of what we call the construction industry.

The map herewith will be illuminating to those who still are prone to measure public works employment by the number of men they see at work at the job. It will help them to visualize that second army behind the lines. On a smaller scale this map may be duplicated for every such project.

It will be of interest also to those manufacturers of materials and equipment who would sell most efficiently to the construction market. Here they may see, magnified many hundred-fold, a picture of construction industry buying. The manufacturer who would get the most for his sales dollar in this field must take into account a widespread, multiple buying practice.

Many minds enter into each buying decision and no one of them can safely be ignored. From the preliminary layouts to the actual installation, he must be selling all the way down the line and across the board all of the time.

In no other industry is it more important for the producer to use those sales and promotion facilities that will enable him to maintain constant contact with such numerous and widely-separated purchasing factors over long periods of time. For only thus can he insure that his product will make its precarious way from its first consideration to its ultimate acceptance and installation.

Willard Chevalier

ENGINEERING NEWS-RECORD

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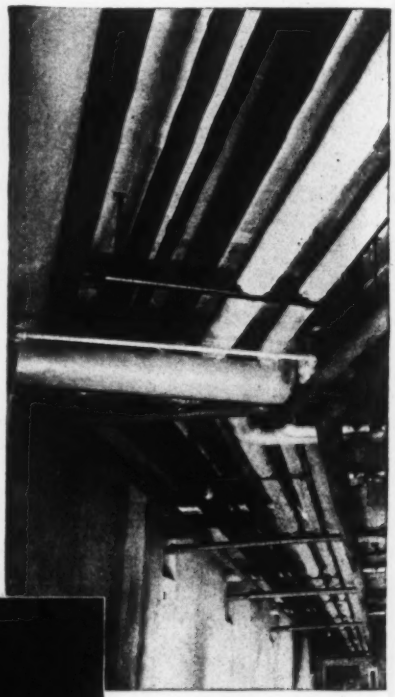

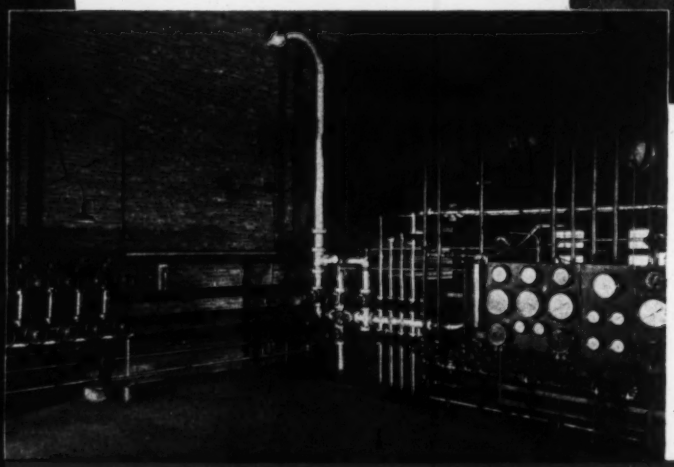

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In the News:

DIVERSION of Ohio gas-tax funds for poor relief has been held illegal by the state supreme court.

CONTRACT for the spillway for the Fort Peck Dam has been awarded to the Massman Construction Co., Kansas City, on a bid of $7,133,005.

CONTRARY to the usual seasonal decline in employment in the building trades during the late fall, this year the union rolls increased by 40,000 during September and October according to statistics of the A.F.ofL.

A NATIONAL PROGRAM for control of stream pollution was initiated at a conference in Washington, Dec. 5. The present plan of those attending the meeting, held in the office of Secretary of War Dern, is to formulate definite recommendations for presentation to Congress which would effect some form of federal control.

THIS WEEK at the Northwest regional planning meeting in Seattle there will be active discussion of a recent proposal for the creation of a Columbia River Authority.

JUDGES of the counties in the proposed $36,000,000 Scioto-Sandusky conservancy program in Ohio have approved the plan and appointed three conservancy commissioners for the district, who will confer with PWA officials on financing plans.

THE REPORT of the water resources section of the National Resources Board has been completed and turned over to President Roosevelt.

AFTER A LAPSE of five years, the manufacturers of railroad appliances and materials will hold an exhibit in connection with the AREA meeting next March.

WITH THE FENDER for the south pier of the Golden Gate Bridge unwatered and concrete placing going forward in the dry from El. —35 (the top of the tremie seal), the pier should be ready for the beginning of work on tower-steel erection by Jan. 1.

AS A FURTHER STEP in the study of the problem of pollution of the Potomac River, the PWA has allotted $25,000 for a study of the Rock Creek tributary, which carries the drainage from many communities in Maryland.

In This Issue:

CONCRETE PLACING by cableway has become somewhat standard procedure for large dams, and the latest example is the twin 1,928-ft.-span installation at Norris Dam. These cableways, which are placing the 1,000,000 cu.yd. in the structure, are described as to design and operating methods.

TO SUPPLEMENT the water supply of Harrisonburg, Va., a concrete cutoff wall was built to intercept the underflow in the valley of Dry River. At a cost of only $37,500 the subsurface dam and collecting system developed a supply of 850,000 gal. per day.

THE SIXTH AND LAST of the series on "Advice to Contractors Entering Government Work" is presented in this issue. They have provided a concise summary of information for contractors who perform public-works contracts for the federal government.

A TRANS-MOUNTAIN DIVERSION TUNNEL is being driven under the Continental Divide in Colorado, to bring water from the west slope and augment the supply of the Twin Lakes Irrigation District, which is 250 miles east in the rich valley of the Arkansas River. The general features of the development and the details of tunnel driving are described.

FOR FOUR YEARS the state of Connecticut has been advising and directing the towns in improving and extending their local roads into a systematic tertiary or feeder-road system. The money comes from state highway funds under an act passed in 1931. Progress and methods of administration and construction are reviewed.

PROBLEMS in the design of reinforced-concrete columns, which have increased with the appreciation of the characteristic most frequently referred to as "plastic flow," are approached from a new angle with a plan for using plain concrete columns encased in a thin tube of steel. This plan of Prof. William S. Lohr, Lafayette College, is described, the design analyzed and test material reviewed in the current article.

PROBLEMS of low-cost roadbuilding and questions of traffic safety featured the sessions of the Highway Research Board, which was attended by 300 highway technicians in Washington last week.

THE CONSTRUCTION INDUSTRY of the Southeast discussed its problems with its code authorities and representatives of the NRA at Knoxville, Dec. 5-7.

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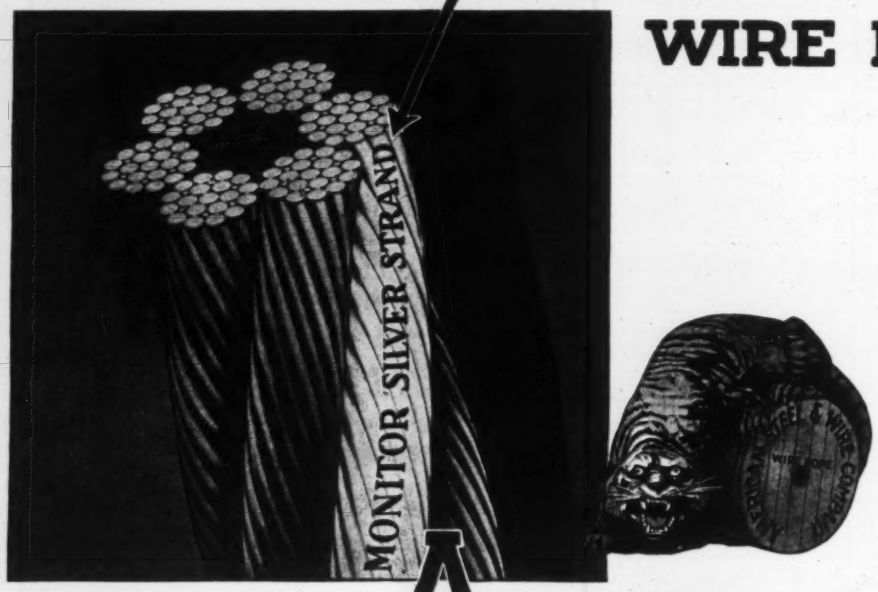

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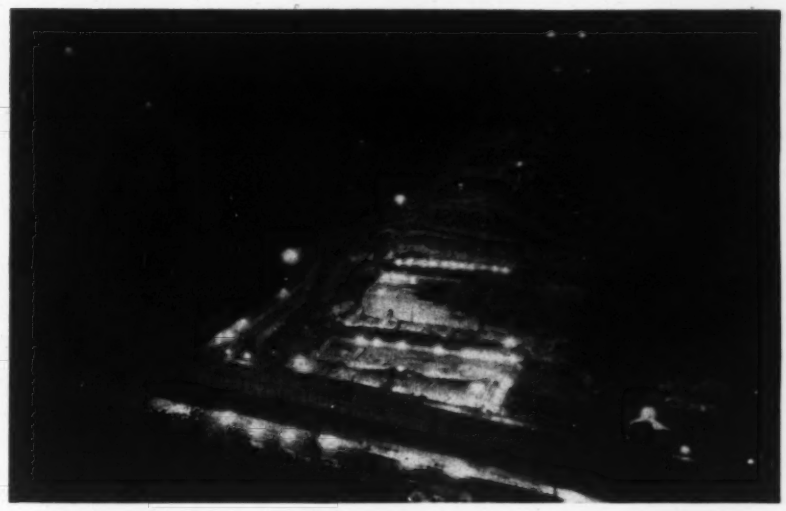


Acme Photo

FIG. 1—NORRIS DAM SITE is spanned by a twin cableway system that is placing the million cubic yards of concrete required for the structure. Excellent lighting for night work is provided by local floodlights and a floodlighting system suspended between cableway towers.

Twin Cableways of Long Span Place Concrete at Norris Dam

Traveling units set high on slopes of Clinch River Valley are designed for fast and flexible operation—High towers erected with rivet bolts for easy dismantling—Floodlights suspended between the towers

TWO traveling cableway units of identical design and 1,928-ft. span are placing at a rapid rate the 1,000,000 cu.yd. of concrete required at Norris Dam on the Clinch River in Tennessee. With the towers operating on tracks set high on the sides of the river valley, to clear the final height of the dam, the cableways handle not only all the concrete but forms, steel and other supplies and equipment as well. Rated at 18-ton capacity each, the units operating in unison have already handled 40-ton sections of the steel penstocks. Full electric operation, telephone signaling and the use of specially designed buckets permit rapid placement of concrete.

The cableways are the third unit in the concrete production and placement plant at the dam. The first unit, the aggregate production plant, was described in *ENR*, Sept. 6, 1934, p. 301. In the issue of Dec. 6, p. 726, the splendid central mixing plant was described. The present article deals with the cableway design and concrete-placement operations.

Ideal conditions for cableway operation at the Norris Dam site were the principal factor in the decision of the Tennessee Valley Authority to use this type of equipment. Though the installation was rather expensive, the large volume of concrete to be handled and the desire for early completion justified the expense involved in comparison with other types of placement equipment. Another factor considered was the intention of TVA to build additional dams on which the cableways could be used, though the entire cost will be charged off on Norris Dam. With future use in mind, the structural-steel towers were erected with rivet bolts for easy dismantling, and the counterweights are removable concrete blocks instead of the customary concrete encasement of the back legs.

Fast operation

The cableways are designed to handle 18 tons on the hook at a conveying speed of 1,200 ft. per minute, at a hoisting speed of 300 and a lowering speed of 405 ft. per minute. Both head and tail towers have a travel range of 475 ft., at a speed of 50 ft. per minute. Head and tail towers move in unison.

Experience in placing the first 150,000 cu.yd. of concrete in the dam has shown that a pouring rate in excess of expectations can be maintained. It was anticipated that each cableway would place concrete at the maximum rate of

15 buckets per hour. Under favorable conditions it has been possible to maintain a rate of 20 buckets per hour, and more than 2,000 cu.yd. of concrete has been deposited by one cableway in a working day of 22 hours.

Design of system

The cableway system consists of two identical units of 75-ft. head towers and 110-ft. tail towers of structural steel, with a span of 1,928 ft. The elevation of the head-tower sheaves is 176 ft. above the top of the dam; that of the tail towers is 108 ft. At mid-point of the cable with a full load sag of 5½ per cent, or 106 ft., the track cable clears the top of the dam by 40 ft. Full loads can be carried to a point 140 ft. from each tower, giving the cableways an effective range of 1,635 ft., longer than the crest of the dam.

Each main-track cable, 3 in. in diameter, is of the locked-coil type. Under rated maximum live load this cable will be stressed to 362,000 lb. The track line weighs 22.2 lb. per foot and has a breaking strength of 1,100,000 lb. At each tower the track cable is anchored to a steel socket mounted on a yoke through a roller-bearing connection. The cable may be turned at will to keep the strands properly set and to distribute wear. Normally it is prevented from turning and twisting by a locking bar on the yoke. At the tail towers the track cable yoke is fastened to a 10-part line take-up through which the sag of cable can be adjusted.

The main carriage consists of twelve 24-in. track wheels, arranged in two banks of six wheels each, to distribute the load over a longer stretch of cable. With the wheels spaced 33 in. axle to axle and the two groups set 6½ ft. apart, the carriage extends for a distance of more than 34 ft. along the track cable.

The carriage is hauled back and forth over the track by a 1-in. endless cable. Under normal operation, a single ⅞-in. hoist line is reeved through the carriage in four parts to a heavy block to which the load hook is attached. A series of eight carriers, resting on the track cable, prevents the hoist line from sagging excessively under light load. The carriers, paid out from the head tower as the carriage moves out, are spaced at intervals of about 200 ft. by a ¾-in. line. This line is fastened to a compensating counterweight at the head-tower end, to allow for changes in sag of the track cable. All sheaves are roller-bearing-mounted.

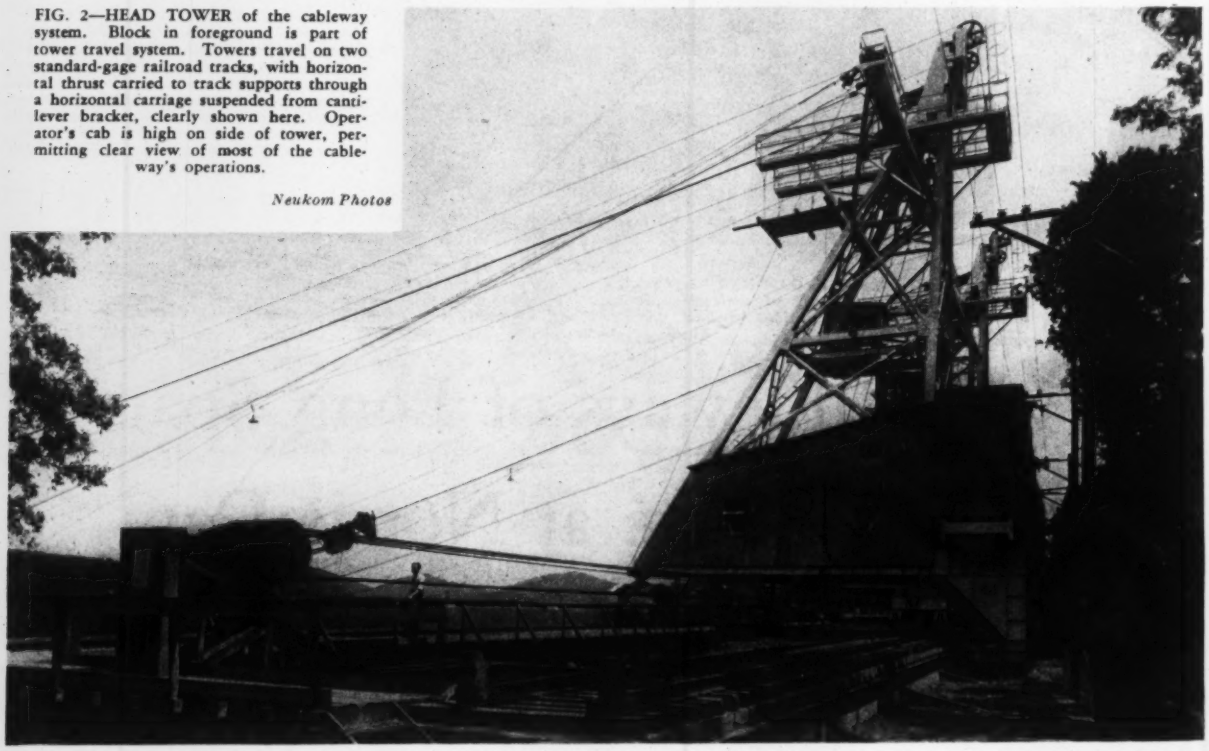


FIG. 2—HEAD TOWER of the cableway system. Block in foreground is part of tower travel system. Towers travel on two standard-gage railroad tracks, with horizontal thrust carried to track supports through a horizontal carriage suspended from cantilever bracket, clearly shown here. Operator's cab is high on side of tower, permitting clear view of most of the cableway's operations.

Neukom Photos

Track and towers

The tower-supporting structure, or runway, consists of two standard-gage tracks under each set of head and tail towers. On the head-tower runway, both tracks on the downstream end and the front track on the upstream end are carried by steel trestles. The outward horizontal thrust on the towers is carried through the trestles at the lower end but is delivered to the rear track on the upstream end, anchored to concrete deadmen. The tail-tower runway operates on two tracks carried on a heavy concrete base over an earthfill. Each head tower, under full load and including counterweights, weighs 650 tons; tail towers under similar load conditions weigh 635 tons each.

Each tower is mounted on four trucks, one at each corner. The trucks, carrying eight wheels on independent axles for easy removal, are connected to the tower bases by a ball-and-socket arrangement that assures equalized loading on all wheels and reduces racking of the structure caused by irregularities in the track.

An outstanding feature of design is the manner in which the heavy horizontal thrust at the top of the tower is transferred to the supporting structure. The floor girders of the towers extend beyond the base at the rear as cantilevers. These cantilevers carry the sectional-block concrete weights, and also support brackets on which are mounted trucks with four wheels each, bearing against a horizontal rail set below track- rail level (Fig. 2). Neutralizing of the bending moment in the bracket, resulting from the downward thrust of the counterweight, is almost completely attained by an opposite moment from the horizontal thrust wheel. Furthermore, the horizontal wheel permits reliable definition of the forces acting on the track structure, simplifying the design of the latter. By limiting the loads on the 32 vertical truck wheels to a 65,000-lb. maximum per wheel, and with the overturning moment in the towers eliminated, it was practicable to increase the height of the towers and to provide self-equalizing construction

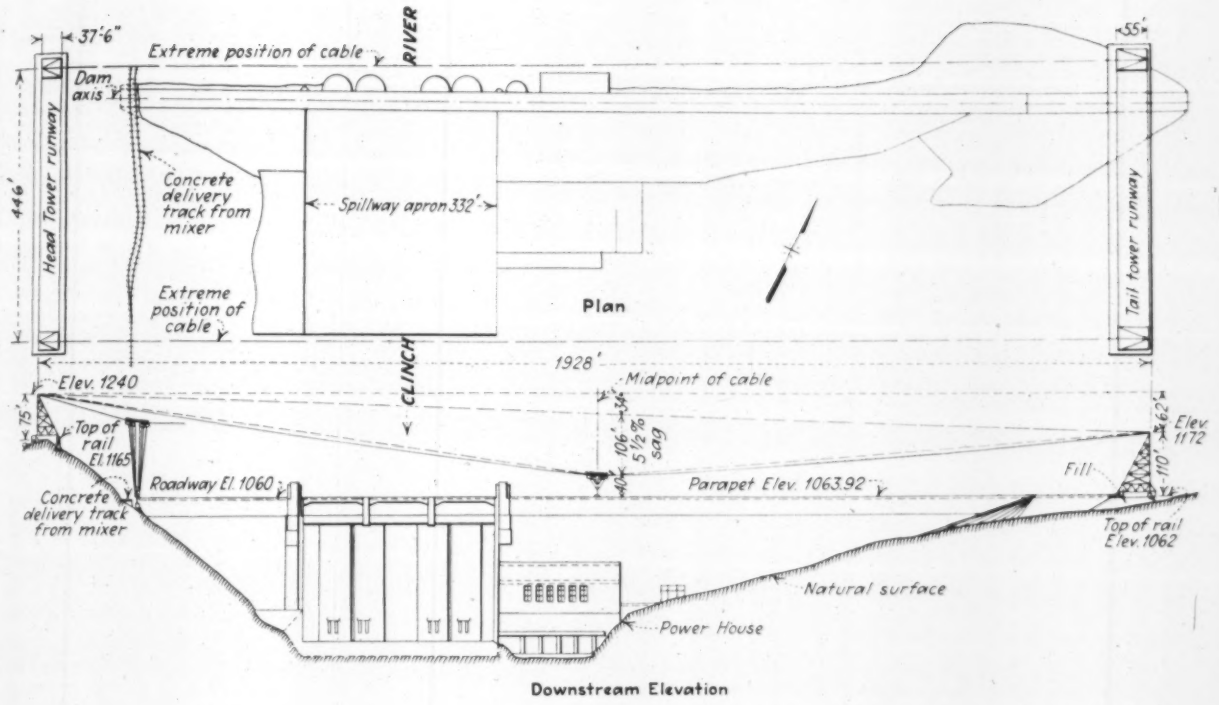


FIG. 3—LAYOUT of the cableway system at Norris Dam.

within the four trucks carrying each tower.

The horizontal-thrust wheels are kept in proper plane and position by supporting their trucks from the cantilever girders by means of rods acting through heavy coil springs. A ball-and-socket connection between the cantilever brackets and the trucks provides for even distribution of thrust loads over all wheels, regardless of irregularities in the rail. The thrust rail is attached to the supporting structure by clamps set in vertical slots, to permit vertical adjustment of the rail.

Counterweights on each head tower consist of 84 precast concrete blocks aggregating 380 tons in weight. Tail-tower counterweights weigh 435 tons. Upon dismantling the cableways, it is planned to use the counterweight blocks as riprap in the tailrace and the spillway.

Operating machinery

All of the hoisting and conveying machinery is located in the head tower. The main hoist for each cableway is an electrically driven three-drum tandem unit mounted on a single bed plate. The three-drum unit was installed to have one drum as a stand-by for the hoisting

FIG. 4—BUCKET OF CONCRETE ready for trip by air to the forms. Buckets are spotted, without being unhooked from the cableway block, on a continuous platform alongside the transfer tracks. Only a few seconds are required to transfer 6 yd. of concrete from cars to bucket.

FIG. 5—BUCKETS ARE DUMPED by compressed air. View at left shows workman applying air nozzle to port on bucket, which actuates a piston, kicking the closing arm free (shown in right view) and permitting the gates to open by weight of the load. When the load is discharged, weight of the closing arm automatically closes and locks the gates. Pipes shown are part of the drainage system, being filled with sand during construction operations.

line and for emergency service, for under normal operating conditions on this job only two drums are used, as the load line is a single line. Consideration was also given to the higher salvage value of a three-drum unit.

Power for travel of the towers is supplied by a 75-hp. motor operating a winch on an endless cable through blocks at both ends of the tower runway. Limit switches prevent the towers from overrunning the ends of the runway, and cut-off contact arms extending from the towers prevent the two cableways from approaching too close to each other.

Power to operate all electrical equipment is taken from a three-wire trolley line supported at the rear of each runway. Control wires for the tail-tower travel motor span across the valley from tower to tower.

Operation of the main hoist is by remote control from a cab about halfway up on one front leg of the head tower. In this position the operator may see practically the entire range of the hook on the carriage. The remote electrical control manipulates not only all motor operations in the head and tail towers but also all braking. Electrically operated air valves on the main hoist control the air cylinders on the friction clutches of the drums. The band brakes are weight-set and released by air pistons. All lowering of loads is controlled by regenerative braking on the main hoist motor.

All signaling for cableway operations is done by telephone. Two signal men are employed for each cableway, one being located in the hole where the concrete is being dumped, and the other on the transfer platform where the concrete is moved from railway cars to the cableway buckets. The operator in the cab receives signals over the telephone system through an amplifier horn. The operator also has a transmitter through which he can talk to the signal men. All telephones are on the same line, and all three men are constantly in touch with each other.

Lighting system

Advantage was taken of the cableway installation to install an unusual lighting system for night work. Floodlights on the towers and floodlights and smaller lights in the cofferdam afford local distribution of illumination. An over-all lighting system for the entire site is provided by suspending 1,000-watt electric lamps on the cableways (Fig. 1). To support these lights, each pair of cableway towers carries two ¼-in. messenger lines, spaced 50 ft. apart on centers. This places the rows of lights 25 ft. from the track cable, with the messenger lines carrying them sagged during the early part of the job to locate the lamps a maximum of 50 ft. below the track cable at the middle of the span. In this position the messenger cables and the lamps are entirely out of the way of all operations. A large item of electrical maintenance expense and breakage is thus eliminated as compared with a more extensive illumination system on the ground.

Suspension for the two lamp-messenger lines was obtained at little additional cost by extending the platforms at the top of the head and tail towers to get the proper spacing for these lines. Each lamp is hung from the messenger line by a 3-in. grooved wheel carrying a simple strap connection to which the light and its weatherproof fixture are fastened. Spacing of the lamps and fixtures is maintained by a ¼-in. wire line to which they are clamped at 200-ft. intervals. The lights are serviced by being drawn into the tail towers by a hand-operated reel.

Concrete placing

From the central mixing plant near the head-tower runway, concrete is delivered to the cableways by quick-dumping transfer cars running on railroad tracks parallel with and 105 ft. below the cableway tracks. The cableway buckets, of special design, are the 6-yd., straight-side, bottom-dump type with self-locking gates. The buckets are set, without being unhooked from the cableway line, on a continuous timber platform below and alongside the concrete track (Fig. 4) prior to spotting of the transfer cars, which eliminates the risk of the bucket swinging against the train. One cableway bucket takes the entire load of a twin-hopper transfer car in about 20 sec.

Guided by telephone instructions from the two signal men, the cableway operator moves the loaded bucket into the forms. An unusual dumping feature permits rapid discharge of the concrete. The buckets are equipped with an air-operated discharge gate that automatically closes and locks after the load is dumped. In dumping, the buckets are spotted just above the point of discharge. The gate is tripped by holding a high-pressure air nozzle against a port on the discharge mechanism, to actuate an air piston (Fig. 5). This system of dumping is very fast, and the bucket is in the forms for only a few seconds.

The upward jump or whip of the bucket upon discharge has been almost entirely overcome by an ingenious arrangement of a simple baffle fixed toward the bottom of the bucket. This baffle is set to control the passage of the concrete through the bottom of the bucket without appreciably retarding the rate of discharge.

Management

The Norris Dam is being built by the day-labor method by the Tennessee Valley Authority. A. E. Morgan is chairman and chief engineer of the Authority. C. A. Bock is assistant chief engineer, C. H. Locner construction consultant, and A. J. Ackerman construction plant engineer. Barton M. Jones is construction engineer on Norris Dam, with Ross White superintendent of construction and F. C. Schlemmer and E. M. Whipple as assistants. The Lidgerwood Company designed and furnished the cableways.

New A.S.T.M. Standard Specifications in Construction Field

A NUMBER of new and tentative standards covering materials used in the construction field were adopted this year by the American Society for Testing Materials and are available from the Society's offices at 260 S. Broad St., Philadelphia. The specifications, with their designating numbers, follow:

STANDARD SPECIFICATIONS ADOPTED IN 1934

(These have been previously published as tentative)

Cold-drawn steel wire for concrete reinforcement (A 82-34)
Electric-resistance-welded steel pipe (A 135-34)
Forge-welded steel pipe (A 136-34)
Lock-bar steel pipe (A 137-34)
Steel for bridges (A 7-34)
Steel for buildings (A 9-34)
Mild steel plates (A 10-34)
Concrete building brick (C 55-34)
Curing portland-cement concrete (C 80-34)
Curing portland-cement concrete slabs with bituminous coverings (C 81-34)
Curing portland-cement concrete slabs with calcium chloride admixture (C 82-34)
Curing portland-cement concrete slabs by surface application of calcium chloride (C 83-34)
Curing portland-cement concrete slabs with wet coverings (C 84-34)
Gypsum wall board (C 36-34)
Gypsum lath (C 37-34)
Gypsum sheathing board (C 79-34)
Spirits of turpentine (D 13-34)
Shellac varnish (D 359-34)
Centrifuged shellac varnish (D 360-34)
Calcium chloride (D 98-34)

NEW TENTATIVE SPECIFICATIONS

(Approved in 1934. Certain of these were issued previously but were extensively revised this year)

Black and hot-dipped zinc-coated (galvanized) welded and seamless steel pipe for ordinary uses (A 120-34 T)
Wrought-iron plates (A 42-34 T)
Sheet copper-silicon alloy (B 97-34 T)
Copper-silicon alloy plates and sheets (B 96-34 T)
Copper-silicon alloy rods, bars and shapes (B 98-34 T)
Magnesium-base alloy sheet (B 90-34 T)
Quicklime for structural purposes (C 5-34 T)
Hydrated lime for structural purposes (C 6-34 T)
Ground fire clay (C 105-34 T)
Sodium silicate for curing concrete (C 111-34 T)
Non-reinforced concrete sewer pipe (C 14-34 T)
Reinforced-concrete sewer pipe (C 75-34 T)
Emulsified asphalt (coarse aggregate plant mix) (D 397-34 T)
Emulsified asphalt (for retread and coarse aggregate mixes) (D 398-34 T)
Emulsified asphalt (heavy premix—summer) (D 399-34 T)
Emulsified asphalt (heavy premix—winter grade) (D 400-34 T)
Emulsified asphalt (quick-setting) for penetration and surface treatment (D 401-34 T)
Timber piles (D 25-34 T)
Creosote (D 390-34 T)
Creosote coal-tar solution (D 391-34 T)

Advice to Contractors Entering Government Work

VI—Power of Seizure Is Great After Default

With this concluding article contractors have been given a useful summary of their restricted rights when performing public works for the federal government

By Howard L. Jones
Cherrydale, Va.

IT IS A PROVISION of the standard construction contract that if the contractor is not making satisfactory progress he may either be permitted to continue and charged liquidated damages or declared in default and the work taken over by the surety or the government.

It is the usual procedure that if at any time the government feels that satisfactory progress is not being made, the contractor is directed to increase his force and equipment; if he fails to comply then, the government will secure such additional employees and equipment as are necessary to complete the work on time. It is held that the expense incurred by the United States in completing the work may be deducted from any amount that is due the contractor.

It is also a provision of the standard contract that the United States may "take possession of and utilize in completing the work such materials, appliances and plant as may be on the site of the work and necessary therefor." The damages caused the United States by reason of the default in performance are reduced by the value of the material and equipment, and the difference between these amounts, if any, is paid to the contractor.

The Supreme Court of the United States held that:

> Acts done in the proper exercise of governmental powers and not directly encroaching upon private property, although their consequences may impair its use, are not a taking within the meaning of the constitutional provision which forbids the taking of such property for public use * * *.
>
> 99 U. S. 635.

Where a contractor abandons his contract, necessitating the termination thereof by the government and the subsequent reletting of the uncompleted portion of the work contracted for to another contractor, no liquidated damages accrue to the United States under the provisions of the contract after the date of its termination.

Completion by surety

It is a well-settled principle of law that, where a surety upon a contractor's bond has paid claims that it was obligated to pay if its principal did not, it is entitled to be subrogated to the rights of laborers and material men so paid, from any funds in the hands of the government belonging to the contractor for work performed on the contract.

The fact that the contractor was adjudicated a bankrupt would not affect the surety's right to the money necessary to reimburse it completely, as its right is superior in law to that of the estate of the bankrupt, which has no greater rights than those of the contractor. The surety's right of subrogation has been held to be superior to the claims of the contractor, or his assignees, for any balance due under the contract which may be necessary to protect the surety from loss in completing the work.

In one case shortly after the award of the contract the contractor made arrangements with a bank to furnish financial backing, and a power of attorney was executed authorizing the bank to endorse checks in the name of the contractor. The arrangement was agreed to by the local manager of the surety. The contractor defaulted and the surety took over the work. It was held that the fact that the surety had knowledge of an agreement between the bank and the contractor did not change the situation in so far as the United States was concerned, for the reason that the bank had no claims against the United States for the amount payable under the contract because the assignment was void under Sec. 3477 of the Revised Statutes. The loans by the bank were also held to be subordinate to the agreement between the surety and the contractor, as they were made subsequent thereto. It was said further that the consent of the surety to payments to the bank would extend only to payments properly to be made to the contractor and not to amounts necessary to complete the contract after default.

The law is well established that the retained percentage, authorized by the contract to be withheld until completion of the work to be done, is as much for the indemnity of the guarantor of the performance of the contract as the one for whom it is to be performed.

It is a rule of the law of contracts that the surety is only entitled to the amount earned by it in completing the contract after default of the contractor, and that the contractor is entitled to the amount earned by it prior to the default, in the absence of a separate agreement.

It has been held that appropriations made for the construction of public buildings must be applied to the purposes for which they were made, and that such appropriations may not be charged with any amount in excess of the contract price, with authorized changes, on a claim of the surety that the contractor was overpaid prior to the termination of his right to proceed.

Where the right of the contractor to proceed with the work has been terminated and the surety on its own initiative completes the contract work, the surety is held to be chargeable with liquidated damages for delays in completion, in the same manner and to the same extent that the contractor would have been chargeable. It is held that in figuring the excess cost incurred by the United States on account of the default of a contractor, no credit should be given the defaulting contractor for the amount of liquidated damages assessed against and collected from the substituted contractor.

Where a contractor defaults in the performance of a contract, necessitating the termination thereof and the subsequent completion of the unfinished work by the government at a cost in excess of the contract price, which excess cost together with accrued liquidated damages for delay in performance were paid by the surety on the performance bond of the defaulting contractor, and it is subsequently found that there were certain delays that were excusable under the terms of the contract for which no liquidated damages accrued, the surety is entitled to a refund of the excess liquidated damages that it had been required to pay for the defaulting contractor.

Defaulting bidders

The standard form of bid bond provides that the surety shall pay the United States the difference between the amount of the guaranteed bid and the amount for which the government may procure the required work. In the absence of such a provision in the bond and when the guarantee is a certified check, it has been held that the amount of the forfeited deposit was intended by the parties as liquidated damages to be paid in the event of default, and no further sum may be recovered.

Driving a Water Tunnel Under Continental Divide

Rapid progress made in solid rock headings of Twin Lakes trans-mountain tunnel at Independence Pass, Colo.—West slope water diverted to east slope for irrigation project 250 miles away

FIG. 1—LINCOLN GULCH, high in the Rockies, and the location of the west portal of Twin Lakes diversion tunnel. The tunnel passes under the snow-capped peak in the background.

UNUSUALLY FAST progress, reaching as high as 48 ft. per day in one heading, is being maintained in driving the 3.85-mile Twin Lakes Tunnel under the Continental Divide at Independence Pass, Colo. In the 30-day period of June, 1934, the east heading (10.7-ft. horseshoe section) advanced 985 ft. through solid rock. By a coincidence exactly the same footage was driven in the same period at the Colorado River Tunnel (17.5-ft. horseshoe) on the Colorado River Aqueduct. This joint record, so far as is known, has been exceeded only once, when the 8x9-ft. pioneer bore of the Cascade Tunnel was driven 1,157 ft. from one heading in the 31 days of October, 1926.

The Twin Lakes Tunnel is being driven from both portals, though progress at the west heading is somewhat slower than at the east end because of the blocky nature of the rock encountered. Scraper mucking is the only unusual feature of the tunneling. Holes 9 to 13 ft. long are drilled from a four-drill column and bar set-up, with 8 to 9 ft. pulled each round.

The Twin Lakes Tunnel serves a unique purpose. Waters from melting snows of the timberline gulches on the west slope of Independence Pass, intercepted on their way to the Pacific, will be diverted through the tunnel for use in an irrigation project 250 miles away. If unmolested, the waters would eventually reach the Gulf of Mexico. This is the second trans-mountain diversion project under way in Colorado, Denver's work on the Moffat Tunnel for additional water supply being the other one, though Twin Lakes will probably be completed first and rank as the pioneer project of its kind in the country. Several other similar projects are contemplated, all authorized by a Colorado statute.

The Twin Lakes Reservoir & Canal Co., owner of the project, is one of the oldest irrigation districts in Colorado, supplying water to about 50,000 acres of land near Ordway, Colo., in the heart of the rich melon and sugar-beet belt of the Arkansas River Valley. Water for the project is diverted from the river by headworks near the town of Rocky Ford. For years the district has owned Twin Lakes, high in the Rockies on the headwaters of the river. The lakes were enlarged by a dam, and the district is entitled to all the water released from them into the Arkansas River. By diversion of waters of several west slope streams, principally Roaring Fork River and Lincoln Creek, an additional 50,000 acre-ft. will be available annually. Diversion will be accomplised by three dams on Lost Man Creek, Roaring Fork and Lincoln Creek, four canals and two tunnels (see map, Fig. 2). All water will be collected at Lincoln Gulch Dam and thence diverted through Tunnel No. 1 under the divide to the east slope. From the east portal of the tunnel the water will flow 15 miles down Lake Creek to the Twin Lakes Reservoir, which will be enlarged by raising the present dam. Another tunnel, known as No. 2, will connect the Lost Man and Roaring Fork diversion with that of Lincoln Creek.

The project is not intended to open additional land to irrigation, but will guarantee sufficient water to land already under cultivation. The district obtained an RFC loan of $1,125,000 for construction purposes. This amount was sufficient for the driving, but not the lining, of tunnel No. 1 and the construction of New York Canal and Lincoln Gulch Dam, all under way at present. The district hopes to sell additional bonds to the RFC for the lining of the tunnel and construction of the other parts of the project.

An interesting sidelight on the project is the high hope held at the start of finding valuable mineral ore within the tunnel that might pay part or even all of the construction costs. The site is near the Aspen and Leadville mining fields, and the whole project was staked out as mining claims. But, in common with every other long railroad and water tunnel in Colorado, not a trace of ore has been found, though driving of the tunnel is well past the halfway mark (14,500 ft. by Oct. 15, 1934), and all kinds of rock formation, slips and faults have been encountered.

Steel-faced dams

The Lincoln Gulch and Roaring Fork dams will be rockfill structures faced with steel plate. Lost Man Dam will be a rockfill of selected materials without the steel face. Outlet conduits will be 4x4-ft. concrete boxes. The Twin Lakes earthfill dam will be raised 12 ft. by enlarging the embankment. The dam in Lincoln Gulch is shown in Fig. 2.

The canals are small, with bottom widths varying from 2 to 16 ft. and water depth 4 to 6 ft. Side slopes, all unlined, will be ½:1 in rock and 1:1 in earth. A log covering over the canals will be necessary at several points subject to slides.

Water through both tunnels will flow by gravity without pressure. Tunnel No. 1 is a horseshoe section equivalent to a circle 8 ft. 5 in. in diameter inside of concrete lining. Plans call for a minimum of 6 in. of lining, with pay-rock line specified at 9 in. outside the neat line. Designed for a capacity of 500 sec.-ft., it has a uniform down grade of

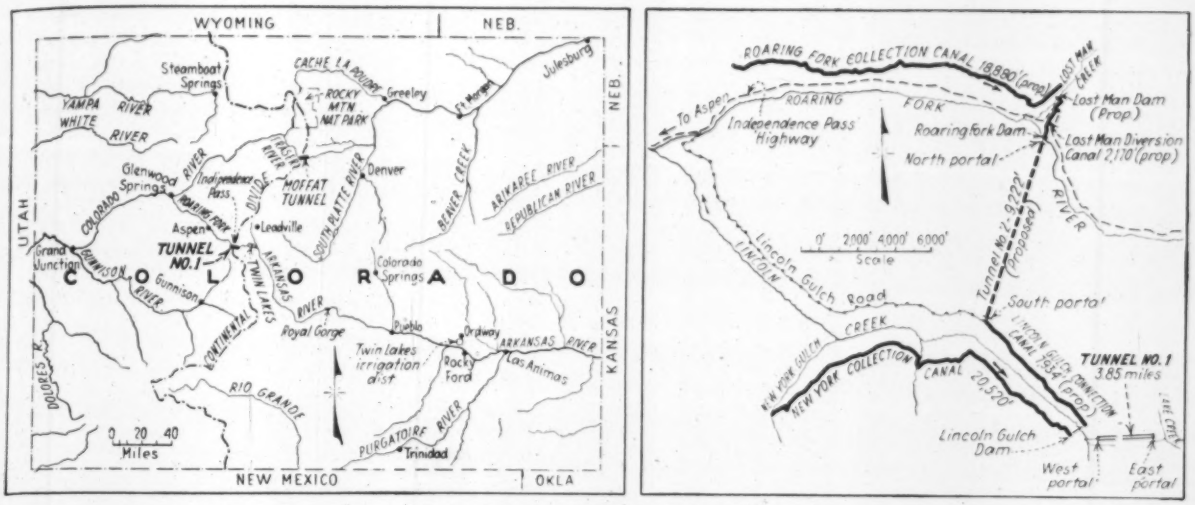


FIG. 2—MAPS of the Twin Lakes trans-mountain diversion project. Left: principal streams of Colorado, showing diversion project in relation to main watersheds. Right: details of the Twin Lakes project. The Lincoln Gulch Dam, New York Canal and Tunnel No. 1 are under construction; other features are proposed.

0.0025 eastward. Full capacity cannot be utilized until the tunnel is lined. Rock encountered is chiefly gneiss and granite porphyry, breaking small in the east heading and rather blocky in the west end.

Work in high altitudes

The contractor was faced with the severe topographical and climatic conditions prevailing at the crest of the Rockies. The west portal is at El. 10,503, only about 500 ft. below timberline. To reach this end of the tunnel necessitated building of a road 6 miles long up Lincoln Gulch from the Independence Pass highway above Aspen. Lincoln Gulch lies in a heavy snow belt, and difficulty was experienced last winter in keeping the construction road open to tractor and sled haulage. The main highway passes the east portal, providing easy access. Transportation between portals is by the main road, which crosses Independence Pass at El. 12,095, and is subject to frequent snow blockades. Preparation work included the building of substantial camps at each portal and the construction of a 13,000-volt transmission line 25 miles long for a power plant at Aspen.

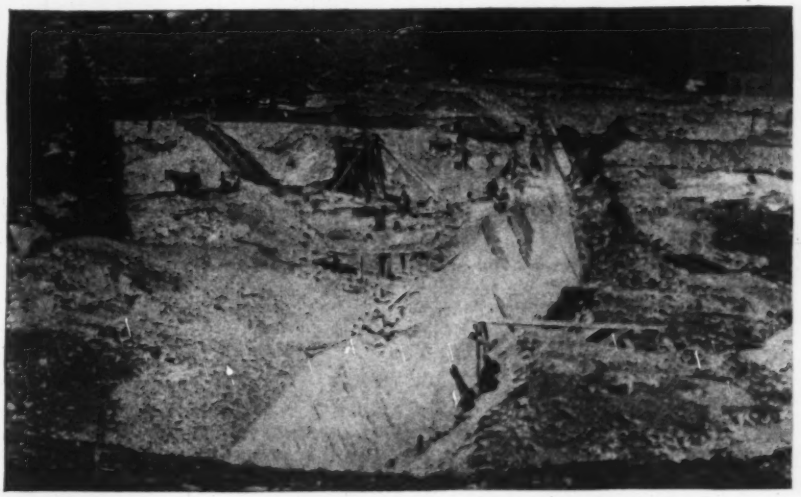
Tunnel driving

The irrigation district desired the first part of the project, including tunnel No. 1 and the Lincoln Creek diversion and collection works, ready to catch the spring thaws of 1935. But delays held up award of contract until the fall of 1933, and actual tunnel driving started on Dec. 5 upon completion of the power line. Despite the late start, completion date was held to May 1, 1935, allowing only 510 calendar days for the driving of 3.85 miles of tunnel. This schedule required an average speed of 21 ft. per day in each of two headings. At present rate of speed the headings will hole through in January, about 13½ months after start of driving. Lining of the tunnel is still indefinite, pending additional financing.

Equipment and driving methods at both headings are identical. Full-face headings, with all shots fired together, is standard practice. A four-drill set-up columns and bars is used, though drilling and blasting layouts differ with almost every round. The speed in driving is largely attributed to the close watch kept on changing rock conditions and to varying the drilling and powder charges to pull the maximum possible footage each round. While there is no standard or typical round, one of 28 holes, often used, is shown in Fig. 4. Two 6-ft. center busters are fired instantaneously. Four long cut holes, 11 to 12 ft., follow on the first delay. Relievers, breakdowns and ribs, drilled 9 to 10 ft., are fired on second to sixth delays. An unusual timing is used on the two bottom lifters, 11 to 12 ft. long, which fire on the third delay, instead of the fifth or sixth.

A 40 per cent special gelatine dynamite is used, with charges varying greatly, according to rock conditions. Full loadings range from 70 to 220 lb. of powder. The primer cartridge is placed second from the bottom of hole, and no stemming is used. Misfires are blown out with water. Shots are fired by the shift boss with a 440-volt line. In the east heading the rock breaks small but is quite blocky in the other heading. Breakage beyond the pay line is estimated at only 3 per cent. Excavation within pay line is 2.89 cu.yd. per foot of tunnel.

FIG. 3—CONSTRUCTION of the rock-fill diversion dam in Lincoln Gulch.



Scraper mucker

An electric-drive, three-drum, scraper-type mucking machine is doing fast work in loading out at each heading. These rings are equipped with 8-cu.ft. scraper buckets, loading directly into 2-yd. cars. As soon as the fly rock is cleaned up by hand, the mucking ma-

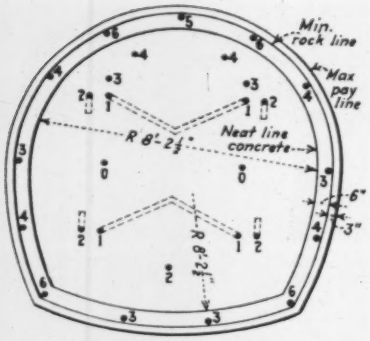


FIG. 4—TYPICAL DRILLING and shooting diagram being used in driving Tunnel No. 1.

chines are spotted close to the muck pile. Two tail sheaves are doweled into the sides close to the face. Lines from two of the drums run through these sheaves and then to the back of the bucket, pulling the empty scraper to any desired position for loading. The third drum handles the load line, which pulls the bucket through the muck to load it, and then carries the loaded scraper up a ramp and to the back of a dumping apron extending over the cars. The mucker and muck trains operate on 36-in.-gage track.

From sixteen to twenty cars of muck are handled each round. The cars, of the steel side-dump type, are equipped with roller bearings, permitting handling in ten-car trains by 4-ton storage battery locomotives. A string of empties is shoved against the mucker, which loads into the end car. Switching is eliminated by an O'Rourke cherry-picker, an air hoist operating on a cross-beam spanning the tunnel near the roof. Empties are lifted out of a train, one at a time, held to one side while the loaded car is pulled back, and then dropped back onto the track at the head end of the train. At the east portal the muck is hauled to waste piles, but at the west end it goes into the Lincoln Gulch Dam as part of the rockfill.

Ventilation is by the blower method, with a 15-hp. fan at the portals discharging 3,500 cu.ft. per minute into each heading through 20-in. fabric tubing. The vent tube is always kept within 200 ft. of the face. After a blast, air is blown into the headings through the high-pressure lines for 10 or 15 min. before the fans are started.

Water has caused no trouble in the east heading, where a flow averaging 25 gal. per minute drains by gravity. In the west heading, being driven downgrade, a 2½-in. centrifugal pump kept the workings dry until about the middle of September. At that time a heavy flow of water was encountered, which at first shut down the heading for a few days, and later flooded the tunnel for two weeks. It is estimated that 20,000,000 gal. was pumped out before work could be resumed. A 4-in. pump is now handling the entire flow in the west end, and no further trouble from water is anticipated.

Fast driving cycle

On the day that 48 ft. of heading was advanced, five rounds were broken—three of 9 ft., one of 10 ft. and one of 11 ft. The rock stood on edge and broke back of the holes. That day the time cycle, blast to blast, was as follows: high-pressure ventilation, 20 min.; move mucker in and mucker out, 1 hour 30 min.; pull mucker out and set up drills, 50 min.; drill 26 holes, 1 hour; pull down, load and blast, 45 min. During this same month five rounds were broken on several days, once measuring 45 ft., twice 43 ft. and once 42 ft. Once a crew made two complete cycles in 18 hours, pulling 18 ft.

The work is under the direction of O. R. Smith, chief engineer of the Twin Lakes Reservoir & Canal Co. Platt Rogers, Inc., Pueblo, holds the contract for tunnel No. 1, Lincoln Gulch Dam and New York Canal. Myron Beswick is general superintendent, and Frank T. Kane is tunnel superintendent for the contractor.

Creating Tertiary Roads by Supervised Town Aid

Connecticut, without taking the freedom from its towns, is helping them to develop a system of local roads that ties in closely with its primary and secondary highway systems

By L. H. Beebe
Resident Engineer of Construction, State Highway Dept., Norwich, Conn.

HOW EFFECTIVE a little money can be in producing improved roads when its expenditure follows a consistent plan is being demonstrated by town-aid roadbuilding in Connecticut. In four years (1931-'34), with an outlay of $17,750 each year in each town, about 1,000 miles of all-weather roads have been built. These roads present no major changes in line and grade but are considerably smoothed out and width and drainage are greatly improved. Altogether, as shown by the accompanying views, these roads are as attractive and as serviceable for their purpose as any road can be.

In response to a public demand to divert a portion of Connecticut's highway funds to the construction, reconstruction, improvement or maintenance of town roads outside the state trunk line and state-aid systems, the Connecticut legislature (January, 1931, session) voted to allocate $3,000,000 annually to such purposes, the sum to be divided equally among the 160 towns, giving each town approximately $17,750 annually. The act directs that expenditures shall be under the supervision of the state highway commissioner and that he shall make agreements with boards of selectmen or other authorized officials, relative to proposed work. The whole of the above sum is applied to construction or materials, no departmental expense, overhead, engineering, design or inspection being taken from it. The town pays any expense incidental to providing additional right-of-way.

FIG. 1—SURFACE-TREATED GRAVEL ROAD 14 ft. wide in the town of Scotland is typical of the better kind of town-aid road construction in Connecticut.

Agreements are made each year. Prior to making an agreement the towns hold a duly warned meeting at which it is decided how the allotted funds, within the limits of the act, shall be used. In the more thickly settled areas of the state much or all of the money is used to purchase materials for maintenance of existing roads. This article, however, deals with a district (Fig. 2) consisting of 39 towns in the eastern part of the state, where the policy generally is to construct or reconstruct existing dirt roads. Here a typical agreement might read: "To grade, drain, install necessary culverts and sub-base and construct a 14-ft. rolled-gravel road on the following sections"; here follows name of road or section number, description of beginning and ending, or amount of money to be spent on such section, a reference to typical section, width of shoulders and often surface treatment.

The number of sections of road to be built in a town in any one year varies with the policies of the different towns from a single section in some towns to as many as twelve sections in others, four sections being a fair average. The type of road called for varies also from a 12-ft.-wide, loose-gravel-surfaced road (traffic compacted) with no shoulders and no surface treatment to an 18-ft.-wide, rolled, waterbound-gravel-surfaced road with 2-, 3- or 4-ft. shoulders and a bituminous surface treatment of two applications. It is almost the rule to call for some type of bank-run gravel surface in this district, since abundant glacial-lake deposits exist here and the cost of the material is little more than the cost of loading, hauling and placing.

Design and construction

A glance at the accompanying map will show the gratifying progress made in the past three years and now under way in the fourth year, in linking up a tertiary or feeder-road system in connection with Connecticut's trunk-line and state-aid secondary systems.

Collaboration is had with the selectmen or authorized town officials in the design of these roads; it is usual to follow existing roads, with few exceptions, renewing all drainage structures and improving only the most objectionable existing alignment and grades. To improve drainage, it is generally necessary to raise grades somewhat more than that achieved by the mere addition of a 6- or 8-in. surface. The average grading, exclusive of surface, is perhaps about 1 cu.yd. per linear-foot of road. Alignment and grade are almost universally planned subservient to existing natural drainage. No detailed topography is taken or maps prepared. The proposed alignment is selected in the field, run out and referenced, and offset-stakes are set at random. Profiles showing existing and proposed grades, culverts and other proposed highway appurtenances, cross-sections and detailed estimates are prepared for the convenience of bidders. The work is advertised, bid and contracted for on a unit-quantity basis.

The same general specifications for road and bridge construction are adhered to on these roads as are used on trunk-line work. The specification for bank-run gravel is substantially as follows: free from rotten stone, loam and vegetable matter; all to pass a 3½-in. square opening and at least 50 per cent retained in a ¼-in. square opening; sand filler to be added if necessary to fill voids; ability to sustain traffic without excessive rutting. It is seldom that a gravel is found that is too clean to bind well.

It is specified for loose-gravel construction that "Spreading shall begin at the end of the project nearest the source of supply—in such a way that, as the work progresses, the gravel is trucked over what is already in place so as to obtain as much compaction as possible during construction." It is also stated: "As the work progresses, and before completion and final acceptance, the contractor shall drag and reshape the entire project." These roads being mostly narrow, it is difficult to use a grader and operate as above required, since it is necessary to move the grader back away from the operation and to one side every time a truck arrives. Also, while it is permissible, it is seldom practicable to spread the total depth in one layer; hence the contractor gains little by this feature.

The method used on rolled gravel is to start spreading at the end of the project farthest from the source of supply, the trucks turning at the nearest

FIG. 2—TOWN-AID ROAD PROGRESS in district comprising 39 towns in eastern Connecticut. With only $17,750 spent in each town each year for four years, note the growth of continuous lines of improved roads.

FIG. 3—UNTREATED GRAVEL SURFACES are used where towns do not desire extra expense of oiling. Shoulder construction is in progress on this road.

FIG. 4—FIRST GRAVEL COURSE being spread and rolled on a 16-ft. town-aid road in Connecticut. Note the indication of substantial construction.

convenient place and backing up to the spreading operation; the grader is then in no way interfered with, moving forward to spread the gravel as dumped and back to correct irregularities. Behind the grader, of course, the roller is working. It is not required to reshape a rolled-gravel job before final acceptance. Quite often contractors have elected to build a rolled road in lieu of loose gravel because of the greater convenience.

Supervision and accounting

The same rigid inspection is maintained in the construction of these town-aid gravel roads as is the policy on trunk lines. Since it is not always possible or economical to give these roads the same study in design as would be given on larger work, and since it is often more desirable to fit local conditions as they are found, substantial practicality and resourcefulness are required of the inspector.

The amount of money to be spent on each section of road and on the whole contract is definitely limited, so it is also very necessary that an accurate estimate of costs be kept up to date at all times. A quite elaborate cost system is used to insure against failure in this matter. The inspector in charge starts out with a complete estimate for each section, based on the contract unit prices and rather high estimated variable quantities such as rock excavation, gravel sub-base, rubble drain, etc., and a contingent item is about 5 per cent. As the grading progresses and better knowledge of the variable quantities is had, he revises this field estimate. A work-order system is used whereby the inspector issues written orders to the contractor immediately as the occasion arises (a copy goes to the resident office) for every item of increase. These orders are checked and totaled in the resident office.

A third line of defense in use, to prevent over-running of the available money, is a budget system which substantially is a form debiting all increases and crediting all decreases, issued monthly or more often if necessary, from the resident office to the main office, with a copy sent to the inspector.

In the three years 1931, 1932 and 1933 there have been built in this district 93 miles of loose gravel at a total cost of $434,850 and an average cost per mile of $4,656, and 140 miles of rolled gravel at a total cost of $728,000 and an average cost per mile of $5,206.

The policies of the various towns as to surface treatment are far from uniform. Possibly 20 per cent of the towns in this district ask for surface treatment included in the construction contract, 40 per cent more surface-treat in collaboration with another bureau of the department, either immediately after construction or from six months to a year after construction when the fill and surface are better seasoned. The remaining 40 per cent have left the road surface untreated. No experience has been had in this district with any surface other than asphalt and tar.

For new work the following has given very good results. The first application of ½ gal. per square yard of 45 per cent asphaltic road oil is followed immediately with a light brush drag or very light hone. In good weather, with a fair amount of traffic, the second application (⅓ to ½ gal. per square yard of 65 per cent asphaltic road oil) is applied in approximately a month, sanding sufficiently just to cover the oil and dragging with a somewhat heavier hone.

For all later maintenance purposes ½ gal. per square yard of 65 per cent asphalt or tar with light sanding and heavier honing works well. The average cost for two applications of bituminous surface treatment as above described has been found to be about $900 per mile.

Maintenance and wear

Upon completion, the roads are turned over to the towns for their future maintenance. Upon application from the town for materials, maintenance may be paid for from reserve or future town-aid allotments. It has been remarked, in the case of one or two towns where little or no maintenance has been done that the effort to get the farmers "out of the mud" has resulted only in putting them "on the rocks."

A very few roads, constructed late in the fall, have rutted seriously the following winter. This has been due probably to the fact that the fills and gravel had no opportunity to dry out and become seasoned before winter set in. No roads have rutted or failed to sustain traffic after their second season. In spite of the very severe winter of 1933-34, every road in the district came through in exceptional shape, while near-by unimproved roads were impassable to motor-vehicle traffic for weeks due to the depth of frost. It is well known, but may well be repeated here, that the secret is to keep the water away. Side and cross-drainage must be working, gutters in wet locations must be low enough to keep the subgrade dry, and gravel or rockfill sub-base must be used over retentive soil or where capillary attraction can take place. If the water cannot be kept away from the road, the road must be kept away from the water—that is, the grade kept sufficiently high.

Groundwater Cutoff Wall Provides New Water Supply

Harrisonburg, Va., adds to its supply by building concrete wall in valley from surface to bedrock to intercept underflow

By A. B. McDaniel
Consulting Engineer, Washington, D. C.

LED BY the water shortage that developed during the great drought of 1930 to give consideration to an addition to its water-supply facilities, Harrisonburg, Va., has built an unusual groundwater-supply system, comprising essentially a concrete cutoff wall to intercept the underflow in the valley of the Dry River. Directly behind the wall there was built a collecting gallery, from which the water is conveyed by pipe line to the existing supply mains.

FIG. 1—TOP OF THE COLLECTING GALLERY and a portion of the top of the cutoff wall in new groundwater supply of Harrisburg, Va.

The city of Harrisonburg is situated in the Shenandoah Valley about 6 miles west of the southern extremity of Massanutten Mountain and about 12 miles east of the easterly slope of the North Mountain Range. The business section of the city lies at an elevation of 1,320 ft. above sea level, and the principal residential district is located on the eastern slope of a hill that rises to a height of about 100 ft. above Main Street. On this ridge above the city are the two distribution reservoirs, one having a capacity of 6,000,000 gal. and the other 15,000,000 gal.

In 1921 the city constructed a concrete dam 100 ft. long and 10 ft. high in the channel of Dry River, 15 miles west of the city. About a quarter of a mile below the dam and on the west side of the valley is the intake works, the construction of which was begun in 1899. It consists of a concrete flume and a pool or collecting basin that receives the flow from a spring-fed stream along the west side of the valley. A 12-in. pipe carries the water during the low-flow period of the summer months from a small collecting basin behind the dam in the river channel to a 12-in. cast-iron main that is one of two parallel supply lines from the intake pool to the city. The other supply line is a 10-in. cast-iron main. The 10-in. main is also supplied with water from the bed of the main river channel during low-water periods by an 8-in. cast-iron pipe which runs to a sump in the bed of the river about 800 ft. below the dam. The general layout of the intake works, dam and pipe lines are shown in Fig. 2. The watershed area above the intake works is about 57 square miles.

Due to the great deficiency of flow in the Dry River Basin during the summer of 1930, the city found it necessary to secure an auxiliary supply. This supply was provided by an 8-in. cast-iron pipe line 2 miles long from Silver Lake to the 12-in. main at Dale Enterprise. The water was pumped from the lake at the rate of 600,000 gal. a day for 133 days, at an operating expense of $10,305. Early in January, 1931, the surface-water supply at Rawley Springs picked up sufficiently to do away with the auxiliary supply, which was objectionable both for domestic and industrial use on account of its high total hardness of 251.

Preliminary investigation

At the request of the city council, the author's firm began a field investigation and study for the improvement of and addition to the water supply of the city. A survey was made of all existing sources of water supply, including springs, spring-fed lakes, surface-water streams, wells and storage. It was recommended that further investigation be made of the economic practicability of building an impounding and regulatory reservoir in the Skidmore Fork Basin in the headwaters of the Dry River watershed.

A field investigation was made that included core drill holes, churn drill borings and test pits at proposed dam sites in the Skidmore Fork and Gum Run basins, and in the territory adjacent to the city's intake. These investigations showed the economic impracticability of constructing a dam at either of the two proposed locations in the Skidmore Fork and Gum Run basins and of securing water from wells near the city's intake.

Geologic studies and pumping tests in the pits across the valley from the dam in the river channel clearly indicated the presence of groundwater flow over the valley floor in many isolated streams and the practicability of intercepting this flow by an underground dam extending across the valley. Recommendation was made to the city council to construct a system of groundwater intercepting and collecting works comprising a reinforced-concrete wall or dam extending from the old dam in the river channel to the rock cliff on the west side of the valley, a distance of about 900 ft. These works would be located 1,200 ft. up the valley from the city's intake and would make possible the diversion of the underflow from a collecting gallery in a natural gorge on the west side of the valley through a supply main by gravity flow to the existing intake works. The city council approved of this project. In November 1933, authorization was given for the preparation of an application on behalf of the city for a PWA loan and grant of $50,000. This application was approved by the state PWA engineer, but was indefinitely held up in Washington on account of the overallotment of funds for the state of Virginia for PWA projects. In March, 1934, the city council authorized the construction of the proposed ground-

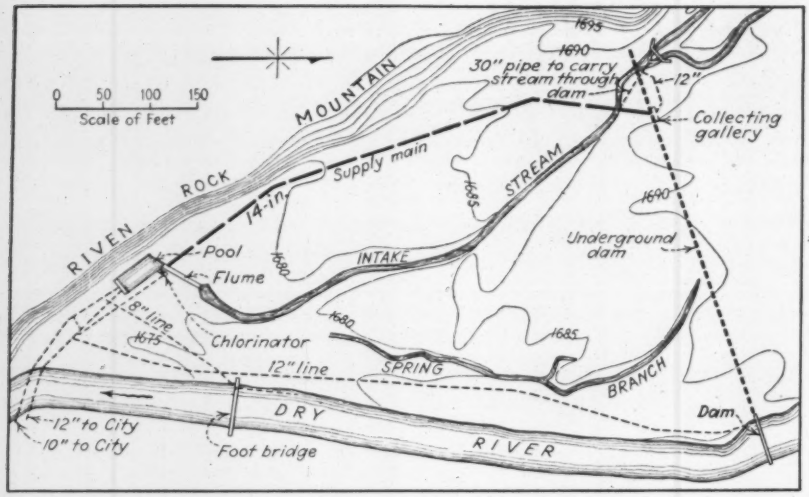


FIG. 2—UNDERFLOW down the valley of the Dry River is intercepted by the underground dam and is conveyed to the existing supply mains.

water collecting works with funds secured from local banks, the work to be done by local labor forces under the immediate supervision of the city engineer.

Construction of project

During the last week of March the city engineer initiated the construction work with the building of a small office building, tool house, blacksmith shop and cement sheds adjacent to the site of the proposed submerged dam. During the latter part of April, actual construction was begun with the excavation of the trench and the laying of 600 ft. of 14-in. cast-iron pipe at the intake end of the proposed supply line and 100 ft. of 30-in. cast-iron pipe and headwall for carrying the intake stream through the submerged dam. During the month of May the remaining 576 ft. of the 14-in. supply line were laid.

The excavation for the submerged dam was begun at the west side of the valley early in May. The first 150 ft. of this excavation was done entirely by hand labor. West of the 30-in. pipe line an excavator equipped with a 43-ft. boom and ¼-yd. clamshell bucket excavated the trench to a top width of about 20 ft. and a depth of 10 to 12 ft. The lower section of the trench was excavated by hand labor. The trench prism was so located as to provide sufficient space on the upstream side of the dam for the handling of the groundwater, which was largely confined in a channel along the upstream face of the trench. Along the west side of the valley especially there was some ground-water flow out of the downstream face of the trench, which was largely back-flow from the intake stream. Every effort was made to confine this backflow to a minimum by carrying the intake stream in a wooden flume about 150 ft. below the downstream end of the 30-in. pipe.

The excavation of the footing trench

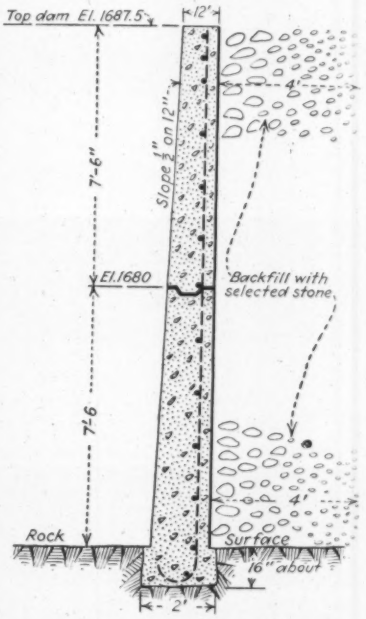


FIG. 4—THE CUTOFF WALL was built in two sections, the first extending from rock to within 7½ ft. of the top. The top is level with the spillway of the existing dam in Dry River.

FIG. 3—SELECTED STONE from the excavated material was used as backfill on the upstream side of the wall and around the collecting gallery.

in the valley floor was done largely by quarrying, using a pavement breaker operated by a portable air compressor. In one or two sections it was necessary to blast out short lengths of the rock trench. This was done with center holes and light charges of 40 per cent dynamite, so as not to open up adjacent seams or contact planes in the valley floor.

The results of the excavation of the trench across the valley fully confirmed the indications made by the test pits and the reports of the consulting geologists, Charles Butts and Irving Crosby, who cooperated in the preliminary investigation of 1931-32. The valley floor consists of a fine-grained, closely cemented, hard sandstone, the Pocono sandstone. At the west side of the valley the narrow gorge exposed a narrow stratum of a hard, dark-colored, indurated shale. The preliminary investigation and subsequent excavation showed that this shale is as tight and impervious to the flow of water as is the sandstone.

About twelve large underground streams were encountered across the valley. Between these major streams there were minor flows through the overburden or drift. The flow of these streams varied from about 150 to 300 gal. per minute, as nearly as could be estimated. The most difficult part of the construction work was the intercepting of these streams, especially during the pouring of the footing sections of the concrete wall. The pumping requirements were taken care of by one 4-in. and one 6-in. centrifugal pump, and a gasoline-engine-driven diaphragm pump. The total pumping capacity of this equipment was about 800 gal. per minute.

To secure a fairly accurate estimate of the amount of groundwater flow during the construction period, three series of measurements were made by an engineer of the state water resources and power office. These measuremnts were made on July 19, Aug. 27 and Sept. 26, 1934. The following data give the essential results:

1. Flow in intake stream at upper end of 30-in. pipe on upstream side of submerged dam:
   1,467 g.p.m. on July 19.
   1,260 g.p.m. on Aug. 27.
   1,395 g.p.m. on Sept. 26.
2. Flow in intake stream at concrete flume of intake works:
   1,350 g.p.m. on July 19.
   1,170 g.p.m. on Aug. 27.
   1,620 g.p.m. on Sept. 26.
3. Groundwater flow collected along submerged dam at exit end of pipe at intake works:
   594 g.p.m. on July 19.
   590 g.p.m. on (includes estimated amount of about 10 per cent of total) Aug. 27.
   1,125 g.p.m. on (about 10 per cent of which was from extraneous sources) Sept. 26.

It will be noted that the groundwater flow on July 19 and Aug. 27 was about the same—namely, about 850,000 gal. per day. The surface flow decreased during this five-week period about 300,000 gal. per day, while the groundwater flow remained nearly constant. This condition is accounted for by the normal summer drop of surface flow and the increase in groundwater flow due to the extension of the excavation for the trench and the resulting addition of several underground streams. The considerable increase in both surface and groundwater flows shown by the Sept. 26 measurements was due to the excessive rainfall during the month of September. It should be noted in this connection that the rainfall shown by the records of the Dale Enterprise Weather Bureau station, for the first six months of 1934, indicate a subnormal condition. During July and August the rainfall was about that of the 54-year average.

The groundwater collecting works comprise a reinforced-concrete dam or wall and a collecting gallery on the upstream face of the wall in the gorge near the western side of the valley. The wall has a top width of 12 in.; the upstream face is vertical, and the downstream face has a slope of ½ in. to the foot.

The wall was built in two sections, a footing section and a wall section, the former stopping at El. 1680. The wall section has a constant height of 7½ ft., and the top is level with the top of the dam in the river channel.

The collecting gallery is a rectangular chamber 25 ft. long, 5 ft. wide and 16.5 ft. high inside. At the ends of the gallery, about 2 ft. above the floor, are the intake openings, which are 3 ft. square and protected with cast-iron gratings. The water is carried from the collecting gallery in a 14-in. cast-iron outlet pipe, which is provided with a gate valve at its intake end in the chamber. The water in the intake stream flows through the 30-in. line and can be diverted to the collecting gallery through a 12-in. main. Such a diversion will be made during low water or drought periods, to avoid loss through seepage and evaporation. The intake openings are controlled by sluice gates operated by stands at the top of the collecting gallery, which extends about 3 ft. above the adjacent ground surface.

For drainage, a perforated concrete pipe line was laid along the upstream toe of the dam. Opposite each of the major underground streams, a tee was placed in the pipe line, and a line of smaller pipe extended to the outpouring of the stream at the upstream face of the trench.

On the upstream side of the dam the trench was backfilled over the drainage pipe with rock graduated from the large-sized stone on the bottom and against the wall to the smaller stone and sand at the top and along the outer face of the trench. Back of the wall the trench was backfilled with earth and small stone. About 8,300 cu.yd. of material was handled at an average unit cost of 37 ¢ per cu.yd.

The total cost of the project was $37,567, of which $17,624 was spent for labor and $14,875 for materials. Miscellaneous expenditures included $2,025 for the rental of the excavator, $30 for office expenses, $542 for workmens' compensation insurance, and $2,470 for engineering, testing and inspection. The estimated cost of the project, based on handling the work two years ago by competitive bids and lump-sum contract, was $35,000. Assuming a 20 per cent increase in the cost of executing the work during the summer of 1934 on the competitive contract basis, it is possible that the city of Harrisonburg may have effected a saving of about $4,500 by doing the work by force account—utilizing its available resources of labor, materials, equipment and machinery as far as practicable.

The field surveys, studies and design were made largely by the writer. He also supervised the later stages of the construction. Valuable assistance in the preparation of the working drawings and early supervision of construction was rendered by Harry W. Thompson. William G. Myers, city engineer of Harrisonburg, was in direct charge of construction.

Stainless-Steel Air Main Installed at Milwaukee Sewage Plant

IN CONNECTION with the extension to the Milwaukee sewage-treatment plant, a main air line of two-ply stainless-clad steel, 60 in. in diameter, is being installed. The line will carry compressed air to the aeration tanks.

The problem confronting the designers of the airline, according to Darwin W. Townsend, consulting engineer of the Milwaukee Sewerage Commission, was the choice of one of two feasible schemes: the use of a cast-iron-pipe air main, 72 in. in diameter which, because of its size, weight and numerous joints, would necessitate the construction of a new brick gallery housing some 700 ft. long, or the use of a lighter rustless pipe of smaller diameter that could be carried through an existing gallery. The friction coefficient arbitrarily selected by the designers for the stainless steel, because of the smoothness of the surface, was such that a 60-in. diameter pipe could be used. Although the cost of the stainless-steel line was computed to be greater than that of a line of cast iron, the saving made possible through the elimination of the brick gallery cast the balance in favor of the stainless material.

The steel plate used is ¼ in. thick with a stainless-steel veneer on the inside. The pipe has been fabricated in sections about 54 ft. long, each section made up of nine plates.

In fabrication, each plate is formed and then placed in a special welding clamp for making the longitudinal seam, which is a plain butt-weld made with stainless-steel electrodes on the inside and heavily coated mild-steel electrodes on the outside. Circumferential joints are also butt-welds, made after the plates had been sheared square and placed with a 3/32-in. gap between the edges. The total length of the new line is 1,800 ft., of which 1,325 ft. has the 60-in. diameter and the remainder ranges in diameter from 24 to 48 in.

Concrete Columns Encased in Steel Shells Proposed

Use of new type of reinforcement, designed to exert inward radial pressure and at the same time to take no longitudinal compressive stress, recognizes effects of viscous flow

By William S. Lohr
Professor of Civil Engineering, Lafayette College, Easton, Pa.

IT IS BECOMING increasingly apparent to concrete designers that the methods now used in designing reinforced-concrete columns are unsatisfactory. They are unsatisfactory primarily because they are based on the assumption that the concrete is an elastic solid, whereas it is, or at least acts like, a highly viscous liquid. This means that in conventional methods of design it is assumed that concrete obeys Hooke's Law of proportionality of deformation to stress, that it has a definite and constant modulus of elasticity, and that when all stress is removed all deformation disappears. All of these assumptions are at variance with observed facts. Actually, concrete yields gradually, even under comparatively low stress, this yielding extending over a rather long period of time, the duration of which is at present unknown. Hooke's Law is consequently not obeyed, the modulus of elasticity is not constant, and when the stress is entirely removed all deformation does not disappear. This gradual yielding under comparatively low stress and for long periods of time is generally referred to as "plastic flow," although it undoubtedly should be designated "viscous flow," since the "yield value," if it exists, is very low.

This property of concrete has commanded attention for many years. It is only recently, however, that the design engineer has begun to appreciate its full significance with respect to design methods. The paper entitled "Plastic Flow in Concrete Arches" by Prof. Lorenz G. Straub of the University of Minnesota, published in the 1931 *Transactions*, Am.Soc.C.E., and the results of recent research work at Lehigh University and the University of Illinois, sponsored by the American Concrete Institute (*ENR*, March 10, 1932, p. 369) have focused the attention of engineers on the need of significant changes in design practice.

It will be recalled that in the Lehigh tests it was found that when a number of columns were loaded each with its appropriate working load as computed by conventional column formulas, this load being applied at an age of 56 days and maintained continuously for a period of twenty weeks, the unit stresses in the longitudinal reinforcing bars at the end of this period had increased in several cases up to four times, and in all cases over twice the unit stress immediately after loading. Correspondingly, the unit stresses in the concrete decreased to values from one-half to one-twentieth or less of those immediately after loading. (Circular No. 64, Lehigh University, by Slater and Lyse, October, 1931, p. 63.)

The writer believes that the conventional type of reinforcement is poorly conceived and inadequate because it fails to recognize one of the most important properties of concrete, viscous flow. He proposes a radically different type of reinforcement.

Suppose for the moment that it were required to construct a compression member using as the primary load-carrying material one of considerably less viscosity than concrete—say asphalt, oil or, as an extreme case, water. It would be necessary to enclose the material in a pipe of suitable material and apply the pressure at the ends through loosely fitting but leak-proof plungers or pistons. Why not use the same idea with concrete, making use, however, of all the advantages that it possesses due to its much higher viscosity? Using concrete, it should not be necessary to have leak-proof pistons, or in fact any pistons at all. Undoubtedly the most suitable pipe available for encasing is the seamless steel tube.

Encased concrete

The name "encased concrete" has been applied by the inventors to a new type of reinforced-concrete column which is believed to possess many theoretical and practical advantages over the types now in use. The essential features of such a column are indicated in Fig. 1. It will be observed that the entire longitudinal load is applied to a concrete core that is surrounded by a thin tube of steel. This steel tube is prevented from taking any substantial longitudinal stress by making its length somewhat less than that of the concrete core, or by the use of any one of a number of other devices that have been proposed to accomplish the same purpose, and by the prevention, so far as possible, of any adhesion or bond between the concrete core and the tube. This latter result may be obtained by the use of a thin layer of a permanently viscous material of low viscosity between the core and the tube or by coating the inside surface of the tube before the concrete is poured with a thin layer or film of a material to which concrete will not adhere. It is this attempt to relieve the encasing tube of longitudinal compressive stress which constitutes the essential difference between the encased column and the old Lally column.

The steel casing serves a double purpose. It obviously serves as a form for the concrete column. Its principal purpose, however, is to oppose the increase in diameter or lateral deformation of the concrete core by the development of circumferential tensile stresses. The tube will thus exert at all points on the external surface of the core a radial pressure acting inward and directed toward the longitudinal axis of the column. The effect on the core is identical with that produced by an external hydrostatic pressure. In Bulletin No. 185, of the Engineering Experiment Station, University of Illinois, dated Nov. 20, 1928, Richart, Brandtzaeg and Brown reached the conclusion that "The triaxial compression tests showed that the presence of lateral pressures added to the strength of the specimen an amount approximately 4.1 times the magnitude of the lateral pressure."

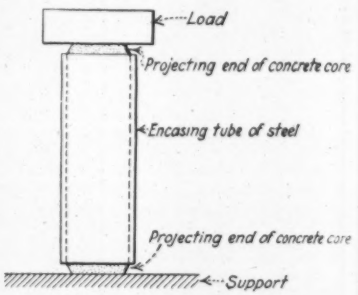


FIG. 1—ENCASING TUBE in new-type column is made shorter than concrete shaft, to prevent its taking any longitudinal compression. Bond is also prevented between steel tube and shaft.

The steel casing takes care of deformations whether they be elastic or viscous. It should be noted that, while in the conventional type of column the viscous flow gradually reduces the effectiveness of the concrete in carrying load, in the encased column the opposite effect takes place. Any flow gives rise to an increased pressure between tube and core. This increase in pressure increases the effectiveness of the concrete in carrying load.

An encased column as used in a building with flat-slab construction would appear in section about as shown in Fig. 2. Since the ends of the tube do not bear on concrete, direct longitudinal compressive stress in the tube is prevented.

In order to design an encased column, it will be necessary to know the unit steel and concrete stresses and the ratio

of lateral pressure between tube and core to the direct compressive unit stress in the core. While it is admitted and anticipated that any values for these factors that are proposed now may have to be revised in the light of long-time and large-scale experiments, the steel stress may be taken at 18,000 lb. per sq.in., and, on the basis of some preliminary tests, the writer proposes that the allowable direct longitudinal compressive unit stress in the concrete core shall be 2,000 lb. per sq.in., and that the ratio of lateral pressure to direct longitudinal compressive unit stress shall be assumed to be 0.12.

Design formulas for the encased column involve the following items:

P = safe load on column, d = inside diameter of steel shell, t = thickness of shell, p = steel ratio, R = lateral pressure between core and shell, f = allowable direct compressive unit stress in concrete core, s = allowable tensile unit stress in steel shell, and k = ratio of lateral pressure to direct compressive stress in concrete.

$$P = 0.7854df^2 \quad \text{and} \quad d = \sqrt{\frac{P}{0.7854f}} \qquad (1)$$

From the well-known formula for pipes subjected to internal pressures

$$Rd = 2ts \quad t = \frac{Rd}{2s} = \frac{kfd}{2s} \qquad (2)$$

Approximately,

$$p = \frac{\pi dt}{\frac{1}{4}\pi d^2} = \frac{4t}{d} = \frac{2kf}{s} \qquad (3)$$

Equations (1), (2) and (3) comprise the simple design formulas needed. Substituting, for the three design constants, $f = 2{,}000$, $s = 18{,}000$ and $k = 0.12$

$$d = \frac{\sqrt{P}}{40} \qquad (4)$$

$$t = \frac{d}{150} \qquad (5)$$

$$p = 0.0267 \qquad (6)$$

These formulas take into account the viscous nature of concrete by reason of the fact that it is intended that the value of the constant k, representing the ratio between lateral pressure and longitudinal compressive stress, will be determined experimentally from long-time loading tests in which sufficient time will be allowed for normal viscous flow to take place; or the value of this constant may perhaps be computed when the flow characteristics of concrete are sufficiently known.

Advantages

1. The encased column will be considerably smaller in diameter than a column of the same capacity designed by conventional methods, due to the higher allowable compressive stress in the concrete. A decrease in diameter permits: (*a*) a large reduction (about 50 per cent) in the amount of concrete required for the column shaft, with consequent saving in cost; (*b*) a saving in floor space; and (*c*) a considerable reduction in the dead weight of the column resulting in some saving in foundation size and cost.

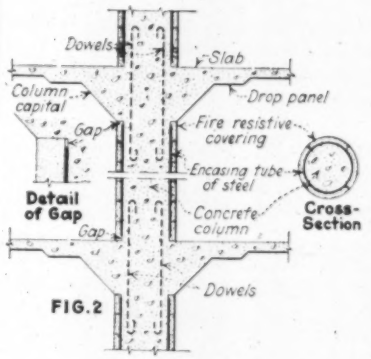


FIG. 2—ENCASED COLUMNS as proposed for use in buildings. Dowels, providing continuity at floor levels, resist the maximum unbalanced end moment developed by the floor construction.

2. No removable form is required for the column shaft except two small and inexpensive gap forms, one at each end. The permanent reinforcing shell constitutes the form for the core. It is proposed that the fire-resistive covering for the shell consist of preformed blocks of gypsum, cinder concrete, or terra cotta tile, which may be erected without the use of forms.

3. The reinforcing steel is subjected to primary stresses of tension, rather than compression, which theoretically allows the use of higher working unit stresses. Moreover, the steel is used in such a manner that its action is of necessity more positive and direct than is the case where longitudinal steel is used with ties or a spiral.

4. It will be easier to place the concrete because of the comparative absence of bars within the steel shell. A few short dowel or continuity bars may be used at each end of the column, as shown in Fig. 2.

5. A circular steel shell filled with concrete has great bending resistance.

6. An encased column is remarkably more tough than an ordinary column. This quality of toughness is highly desirable in structural members, especially so in columns. Its presence adds a valuable safety feature that is absent in a brittle column.

7. It is believed that the encased column has much greater shock-resisting capacity than common types, thus offering increased safety in earthquake zones.

8. It will probably be found possible, or even desirable, in buildings where these columns are used, to load the structure earlier than is commonly the practice, thus reducing construction time and promoting economy.

9. Due to the moisture-proof envelope of steel surrounding the concrete core, variations in lengths of columns due to alternate absorption of water vapor from the air and subsequent drying out are greatly minimized, if not entirely eliminated.

Such preliminary studies as have been made lead to the conclusion that it is possible to save 40 per cent or more of the cost of columns in reinforced concrete buildings by the use of encased columns, and at the same time to have a tougher and altogether more satisfactory structural unit.

Criticisms

Certain criticisms of the encased column, which deserve attention, have been advanced. It has been suggested that multi-storied columns of the encased type will be subject to a degree of weakness at each floor level due to the complete lack of continuity between the reinforcing shells in adjacent stories. In the conventional type of column the longitudinal reinforcing is regarded as being continuous by reason of a lap splice of rather uncertain efficiency immediately above each floor level. Where spiral reinforcing is used, in addition to the longitudinal bars, the spiral in any one story usually has no direct connection with those in adjacent stories.

It would seem, therefore, that no extravagant claims should be made concerning continuity of reinforcing in the conventional column. In the encased column the required degree of continuity may easily be provided by the use of hooked dowel or continuity bars (Fig. 2). A sufficient number of such bars should be provided to develop a resisting moment equal to the maximum unbalanced end moment developed by the beams and girders or the floor slab of the floor construction.

It has also been suggested that the encased column as a whole will be lacking in bending resistance. The writer believes that this question will be satisfactorily answered only by laboratory tests. He is prepared to state, however, that small laboratory specimens have exhibited remarkable toughness and resistance to bending even after having been subjected to extreme distortion.

Fig. 3 illustrates plain and encased cylinders that have been tested at various ages. Specimens 1, 3, 5 and 7 were plain concrete control cylinders 3.69 in. in diameter and 20 in. long. The remainder were steel-encased concrete cylinders originally 20 in. long. The tubes were 19 in. long, allowing the slightly beveled ends of the concrete core to project ½ in. beyond the end of the tube at top and bottom. These tubes, with the exception of 6B, had an

internal diameter of 3.69 in. and a wall thickness of 0.14 in. The tube for 6B was turned down on a lathe to a wall thickness of 0.08 in. The specimens were all prepared from the same batch of concrete and were made, cured and tested as nearly alike as possible. All cylinders were tested with plaster of paris caps about $\frac{1}{8}$ in. thick, allowed to set under an initial load of several thousand pounds. Data concerning the test results for these specimens are given in the accompanying table.

LOAD TESTS ON ENCASED AND PLAIN CONCRETE CYLINDERS

No.	Age When Tested Days	Ult. Load, Lb.	Ult. Load Ratio Encased Cyl. to Control Cyl. of Same Age
1	2	6,090	.....
2	2	105,200*	17.3
3	7	11,360	.....
4	7	121,440*	10.7
5	28	19,030	.....
6	28	113,440*	6.0
6A	28	122,460†	6.4
6B	28	72,680†	3.8
7	56	23,020	.....
8	56	115,420†	5.0

*These values represent the highest load placed on specimen. Test discontinued when both ends of tube began to bear on bearing plate. True ultimate loads probably higher than values given.

†These values represent true ultimate loads as specimens were loaded until considerable bending had taken place and resistance to further deformation was decreasing.

Referring to Fig. 3, it will be observed that the crushing of the control cylinders was discontinued as soon as it became apparent that complete failure had occurred, and before the specimen collapsed. The shortening of each of these cylinders was about 0.05 in. In testing encased cylinders 2, 4 and 6, the tests were discontinued as soon as the exposed $\frac{1}{2}$ in. of concrete at each end had been pushed into the shell and before any considerable bending had developed. The final lengths of these specimens were therefore but slightly less than 19 in. The tests of the remaining encased cylinders, 6A, 6B and 8, were carried to a point where considerable bending had developed and resistance to further deformation was decreasing. When the test of 6A was discontinued, with a deflection at the center of 2 in. and a length reduced to 16.6 in., the specimen was carrying 89.8 per cent of its maximum load. No. 6B, with a deflection of $1\frac{1}{4}$ in. and a length of 17.4 in., carried a load of 85.3 per cent of its maximum; and No. 8, with a deflection of $2\frac{1}{2}$ in. and a length of 16.7 in., supported 75.4 per cent of its maximum load.

Although the percentage of steel which was used in these test cylinders was much higher than that proposed for full-sized columns, nevertheless it is believed that the tests give evidence indicating that the encased column will be found to possess considerable toughness and a wholly adequate bending resistance.

A third objection states that longitudinal deformations will be excessive as compared with those of longitudinally reinforced columns. Here again it may be said that a proper answer to the criticism can only be available after exhaustive and carefully made long-time tests have been completed. A long-time loading test on laboratory specimens, designed to give some information on this question, is in progress at the present time. It has not been continued for a sufficient length of time to warrant drawing any definite conclusions. It seems to indicate, however, that while the early deformations may be somewhat greater for the encased column the difference is not enough to cause alarm. Furthermore; there is some reason to believe that over a long period of time the rate of increase of deformation due to viscous flow will be less for the encased column than in the case of the longitudinally reinforced column.

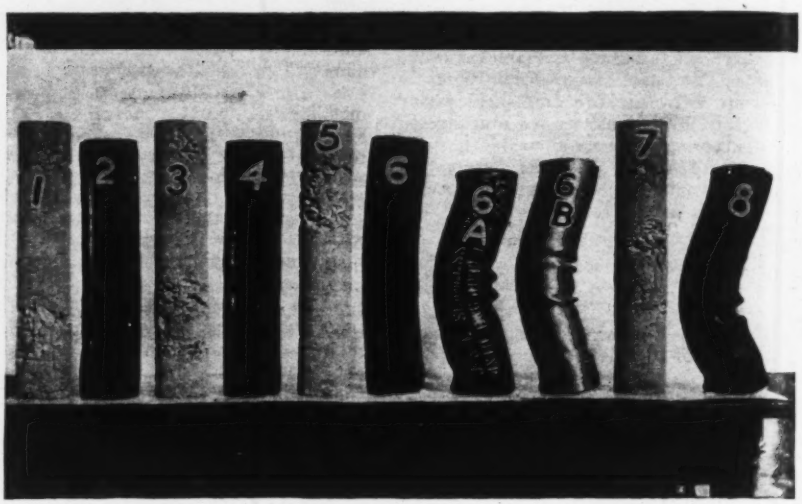


FIG. 3—TEST COLUMNS of plain and encased type, which demonstrated the toughness and high-load capacity of the latter.

The magnitude of these longitudinal deformations in any given case will depend upon the "effective" modulus of elasticity of the column and upon the value of the working unit stress. This "effective" modulus is dependent to a large degree on the value of the modulus for the material or materials of which the column is built, but, for a composite column, it is also dependent upon the method of fabrication or combination of the materials. The inventors of the encased column propose an increase of stress which in itself would increase deformations. They propose at the same time, however, a rearrangement of materials, the effect of which, as far as deformations are concerned, remains to be demonstrated. In order to assure stiffness, it will probably be found desirable to use concrete of high density. High modulus of elasticity may be of greater importance than high strength for the concrete to be used in columns of this type.

It is necessary that extensive laboratory tests be inaugurated on full or nearly full-size specimens to prove the efficiency and economy of the encased column. Especially must proper working values be established for the necessary design constants. These constants are: (1) the maximum safe direct compressive unit stress for concrete encased in a comparatively thin tube of steel; and (2) the proper value to assume for the ratio between the lateral and the longitudinal pressures. Other phases of the problem which should be investigated are: (*a*) determination of the most suitable concrete mix; (*b*) effect of friction between core and shell under the most ideal practical conditions; (*c*) most suitable type of encasing tube; (*d*) effect of end gaps of various widths; (*e*) comparisons of bending resistance; and (*f*) comparisons of longitudinal deformations.

All these tests and investigations must be made with due consideration given to the time element—that is, time must be allowed for normal viscous flow to take place. Incidentally, the fact should be emphasized here that far too little is known about the real physical properties of concrete. This is particularly true concerning its viscous properties.

The co-inventors of "encased concrete" are Eugene C. Bingham, professor of chemistry, Lafayette College; Marcus Reiner, formerly research associate, department of chemistry, Lafayette College, now connected with the department of public works, Jerusalem, Palestine; and the writer. Valuable assistance in planning and in executing the research work carried out in recent months in the materials testing laboratory of Lafayette College has been given by Heinrich Hencky. A patent covering the basic principles involved in "encased concrete" was granted to the inventors on August 21, 1934.

Code Enforcement and Development Topics of Meeting at Knoxville

Enforcement, to be effective, must be a matter of local concern—Regional boards being established—Demoralizing effect of the government's attitude toward the code

PROBLEMS of enforcement and administration of the construction codes were the principal topics of discussion at a four-day combined session of the Construction League, Construction Code Authority, Divisional Code Authority for General Contractors and the Planning and Adjustment Board for the construction code, held at Knoxville Dec. 5 to 8. In addition to the executive members of the four agencies, the meeting was attended by contractors and local code administrators from the entire Southeastern section. Several representatives of the Administration also were present, including James A. Moffett, Federal Housing Administrator; Arthur D. Whiteside, member of the NRA Board, and George L. Berry, Deputy Administrator in charge of construction codes.

Lack of enforcement in the construction codes was the chief complaint of contractors and local administrative officers. Insufficient funds for proper administration also were declared a major difficulty in code operations. Mr. Whiteside, speaking for the compliance division of NRA, promised full enforcement of all codes within 30 days. Regional compliance offices are now being established by NRA, that for the Southeastern states, under the direction of William L. Mitchell, being the first to function.

After promising early enforcement, Mr. Whiteside pointed out to the meeting the opportunities to construction in replacing the obsolete industrial and utility plants throughout the country. Obsolescence is present in every industry, he stated, offering a fertile field for construction operations. He then berated the construction industry for its failure to sell itself. There has been no evidence of construction men appealing to business to build, so far as he has noted. Mr. Whiteside warned, however, that private industry would hesitate to go into a building program unless construction costs were brought into proper alignment with other costs. Once this is accomplished, the construction industry has an opportunity greater than it has had for generations to rebuild industry.

Local code responsibility

Throughout the meeting stress was placed on the necessity for greater responsibility in local code administration. Local agencies have now been established in every state and in the District of Columbia. Stephen F. Voorhees, chairman of the Construction Code Authority, stated that administration by one body at Washington is now recognized as futile and that real administration must come from the field officials.

Several state administrative agency officials reported on progress in the local areas. Probably the most effective is the plan reported by Charles Allen of Birmingham. In Alabama all code agencies have been combined into a central agency with effective results. Fee collections have been fairly satisfactory. Subcontractor bids are checked by this agency before going to general contractors to assure the bids being satisfactory under the code requirements that apply to them, thus eliminating the possibility of a general contractor using sub-bids that might later be ruled out by code authorities as too low. Tennessee has also made progress along this line.

Minimum wage too high

Feeling was bitter among Southern contractors toward the 40-c. minimum wage scale set by the codes. It was claimed that this scale is so far above wages in other industries in the South as to seriously hamper construction. State and municipal bodies are paying less on day-labor operations, with the result that this method of operation is favored to the detriment of contracting.

Southern industries will never go into construction programs as long as the common labor scale is so high, according to statements by contractors at the meeting.

A resolution was offered by a group of Southern contractors asking for a reduction of the minimum rate to 30c. an hour. This was bitterly condemned by a Northern labor representative, who claimed that labor of the South needed elevating instead of depressing. Subsequently the resolution was referred to the Planning and Adjustment Board, which appointed a committee to confer later with the contractors. In another meeting Washington representatives suggested a lowering of the scale by area agreements rather than by change of code requirements.

M. J. Beirne, of the American Radiator Co., pleaded for a closer integration of the construction industry. Construction needs a code, he stated, and we have one of our own making. Compliance must be at least partly voluntary, he declared, for compliance cannot be forced by edict.

Construction League program

The Construction League's contribution to the meeting was the presentation of a preliminary program for the betterment of the construction industry. This program contains points for both emergency, or immediate, operation, and for long-range planning. Suggestions were invited from the field to facilitate the preparation of a revised program to be presented at the annual meeting of the league in January. The preliminary program will be printed in a subsequent issue of *Engineering News-Record*.

The Planning and Adjustment Board announced a plan for the establishment of regional boards, to cover territories closely defined by the Federal Reserve districts. It is hoped to have these regional boards established early in 1935. Eventually they will take over all questions of labor disputes. A committee of the board has been appointed to establish contact with the housing, PWA and relief administrations in Washington for better cooperation with the construction industry. In relation to housing, the board adopted a declaration that the building of American homes for Americans is a job for contractors and the construction industry.

The board is working on a plan to select representatives of both employers and employees for the establishment of area agreements, on the basis of elections, similar to the plan now used for selecting representatives in Congress. The plan has been referred to the legal division of NRA for approval.

Moffett discusses Housing Act

Federal Housing Administrator James A. Moffett addressed the joint meeting at a banquet held Dec. 6. In discussing the Housing Act, Mr. Moffett declared that the act can in no way be regarded as emergency legislation, but is a long-range planning measure; only Title I, directed to modernization, is of emergency character. He believes that upon the expiration of the modernization campaign at the end of 1935 the cost to the federal government of insuring the loans will have been so low, and the bankers will have had such good experience with this credit lending, that they will continue such loans without the formality of government insurance and will lend on the character credit plan, not only for modernization of property but for any and everything the reliable American wants to buy, and will not require that he be a home owner.

Rules and regulations governing Titles II and III of the Housing Act, stated Mr. Moffett, are as satisfactory to the construction industry as if they

had been devised by it. No building boom, so disastrous in the past, is contemplated or desired by the housing administration. Instead, according to Mr. Moffett, a sound, long-range and substantial building program is anticipated. There is a market for 5,000,000 new homes at present, he declared. The first step in a program of home building is to bring the mortgage market back to life. This is one of the jobs of the Housing Administration.

Carl Bock, assistant chief engineer of the Tennessee Valley Authority, outlined the social, economic and construction aspects of the TVA plan. He defended the authority's program of force-account construction and the engaging of the Bureau of Reclamation engineers for aid in designing structures.

The last day of the meeting was devoted to inspection of Norris Dam and road construction work in the newly formed Great Smoky Mountain National Park.

Construction Looks Ahead in Code Government

Present problems are enforcement and inducing governmental authorities to comply with code provisions; long-term problems include improvement of construction finance

By Willard Chevalier

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SPEAKING before the joint meeting of the Construction League, the Construction Code Authority and divisional code authorities at Knoxville last week, reported on the preceding page, Mr. Chevalier took for his subject the present problems of the construction industry, giving special emphasis to those that relate to the construction code, the meeting having been called to attempt to clear up many of the questions that have arisen in connection with the development of the code in the few months that have elapsed since it went into effect. His statement is given in part in the following.
—EDITOR.

WITHIN the short time that has elapsed since the establishment of the construction code, much has been accomplished, but the job is too involved and far-reaching for us to expect that by this time the code would have justified itself by its works. Those who are impatient with progress to date should in all fairness take account of the exceptional obstacles that must be surmounted.

This industry does not consist of a relatively small number of large producing units, such as compose the bulk of the manufacturing industries. On the contrary it is composed of innumerable independent units. From the nature of its work, the established procedure in the award of contracts and the competitive methods fostered by its customers, the industry tends to breed sturdy individualists, unused to cooperative effort and suspicious of anything that looks like a curb on individual liberty of action. The very conditions that have bred strong and resourceful men have bred also a psychology of the lone wolf that hampers the achievement of unity and cooperation.

All this must be borne in mind when we weigh the complaints and criticisms that have already been leveled against the operation of the code and that doubtless will continue to be heard.

Generally speaking, complaints against the code and its administration have to do with the matter of enforcement, or, as it is more pleasantly termed, compliance. Other complaints may in general be traced back to this fundamental difficulty of compliance.

To an outside observer there appears to be substantial ground for such criticism, and I cannot help thinking that if the government through aggressive and sustained action would obtain one conviction in each state for code violation, most of the compliance problems would dissolve in thin air. Respect for law is engendered by the promptness of its enforcement, rather than by the severity of its punishment.

One other aspect of compliance deserves most serious consideration by those responsible for it. That is the attitude of the government itself toward the provisions of the code. We of the construction industry are vitally interested in Mr. Whiteside's promise [made previously at the meeting—Ed.] of full enforcement of codes within thirty days. Let Mr. Whiteside set up a special department to look solely to the *enforcement of our code in federal government activities!* Compliance must start with the government if we are to have full compliance with our code.

Shall the government comply?

When government legislates for the control of industry, it functions as a political agency, and within the scope of the Constitution it may make such statutes as are expedient for the regulation of industry and trade. But when government enters the arena of business as a buyer or seller of the services of its citizens, it should enter that marketplace on exactly the same terms and under the same conditions that apply to private enterprise. If for any reason the government feels that it *must* compete with its own citizens in any form of enterprise, it should, as a matter of common decency, at least, set up no special rules to favor itself. It perpetrates an economic crime when it does this in order to circumvent the codes it has enacted to govern that industry or otherwise, shows disrespect for those codes.

The same considerations apply to the acceptance by governmental officials of goods and services produced by code violators. Regardless of what may be the motives of such officials, the fact remains that if the officials of the United States government or of any other political unit set out to beat the codes and to favor the chiselers, no code, no code authority and no industry will be able to stand up against them.

Let it be said then that the key to the success of the construction code is compliance, and that every act of government, therefore, should be to foster compliance. If the government believes in the code organization that it has set up for the regulation of industry, the least that it can do to demonstrate its good faith is to see that every governmental agency scrupulously observes the provisions of the code and puts a premium on those members of the industry who are trying to live up to its requirements.

Unified industry needed

Turning now to the long-term considerations that will affect the stability and the progress of the construction industry, we find foremost the need to build a unified industry on the foundation that has been made possible by the administrative code born of the NRA. For the first time we have been able to bring together the various elements of the industry to make them conscious of their common welfare and to have their cooperation for common objectives. Here then, is an opportunity for us to put this new spirit of cooperation to work in formulating policies and plans for the long-term welfare of the industry.

Much of the progress of the construction industry, thus unified, will depend on its ability to interpret to the government and to the public those policies that will make for sound construction investment and to promote an acceptance of those policies both through legislation and through public education.

The field is fertile for such an effort. During the economic emergency of the last few years the federal government has turned increasingly to the construction industry as a way out. At this

moment a 1935 construction program is the hope of business and industry. Whether under public or private auspices, the construction program of the next year or two will spell the welfare of a long line of allied industries from plumbing fixtures and home furnishings to excavating machinery.

It is evident also that one of our major tasks is to get private construction investment back into action as soon as possible, and meanwhile stabilize the public-works program on a basis that will be sound with respect to both projects and financing methods. Then we must seek, as private construction takes hold, to taper off the volume of public investment. In doing this we must remember, however, that speed and continuity of capital investment are essential to sustain recovery; public construction must be held ready to make up any deficiency in the private construction program as it may develop.

For sound financing

If private investment, once stimulated, is to continue on a sound basis, the construction industry must do all that it can to stabilize the flow of investment into construction. It is vain to cry for confidence if we do not strike at the influences that shake and destroy the confidence of businessmen, industrialists and investors.

I repeat, therefore, that the conservation of our welfare and the maintenance of a reasonable stability in the construction industry must depend largely on the wisdom and the honesty with which the whole process of investment and financing is conducted, and it should be a primary concern of a unified construction industry to foster sound methods of capital financing and to support the government in its efforts to establish sounder practices than have prevailed hitherto.

Just at the moment it should be our immediate care to dispel the fear that some of the government legislation in this direction must necessarily discourage legitimate business. We must build up a confidence that these laws will be in the interest of honest investors who wish to put their savings at the disposal of competent and purposeful business industry, rather than turn them over to the mercies of speculative manipulation. In doing this, it is important, of course, that while we protect investors against exploitation we see that regulation be not carried to such a point that it obstructs the flow of funds into legitimate industry.

The day-labor construction problem

It is going to be necessary to deal with the invasion of the construction field by governmental day labor, not alone in contracting but in engineering and architecture as well, and here surely is a job for a unified construction industry! To those manufacturers who have a stake in this industry of ours I would point out that this invasion of the contracting and professional fields by the government is establishing a precedent which in all too many cases recently has seemed to sway the government in its attitude toward manufacturing. The best place for the manufacturers to fight the incursion of government into industry is right here in the construction industry, where it has been making its heaviest inroads.

In the field of building particularly, the construction industry can do a job in the revision of municipal building codes so that they may be put on a modern and economic basis, and in the establishment of more satisfactory appraisal practice in connection with mortgage financing. It is reasonable to suspect that, if we had had during the period from 1923 to 1929 a more scientific and professional viewpoint with respect to building appraisal, we might have been spared some of the destructive over-financing that has cost us so dearly.

In conclusion, let us take heart and courage, for we are confronted today by an America that is run down at the heels and only now beginning to realize it. During the next few years a big job of rehabilitation must be done, and the construction industry and those allied with it are going to play an important part in the doing of it.

Roadway Safety Featured by Research Engineers

Large attendance at meeting of Highway Research Board —Program of thirty papers centered on safety in road structure and principles of flexible surfacing

ABOUT 300 technicians concerned in highway research activities were called together by the Highway Research Board of the National Research Council at the annual board meeting held in Washington, D. C., on Dec. 5, 6 and 7. The program included some 30 reports and papers concerning various fields of investigation but in large measure centering on studies of design and construction problems relating to low-cost roads and to roadway structure and construction for safety. A summary only of the great volume of laboratory and field test data contained in the reports and papers is possible in the present running account of proceedings, but a few papers will be considered separately in later issues, and all of course will be published in the proceedings of the board.

Roadway safety

The papers on roadway safety consisted primarily of one on roadway widths, five on skidding, one on friction coefficients relating to skidding, one on highway lighting and one on highway signs as a means of reducing accidents. All of these papers discussed roadway design and structure as functions of safety, traffic regulation as a means of accident control being incidentally considered in another group of papers on highway traffic.

Concerning roadway widths, Prof. R. L. Morrison, University of Michigan, gave a census of 115 accidents occurring on three widths of pavement, 20 ft., 18 ft., and a narrow road 14 to 16 ft. wide. The count showed 30 more accidents on 18-ft. pavement than on 20-ft. pavement, considering only accidents affected by pavement width. Capitalizing these accidents (there was only one fatality) at $500 each, the cost was about $450 a mile, which was considered ample to cover the annual cost of an additional 2 ft. of pavement width. In general, the greatest increase was in side-swipe accidents, and the per cent increase in truck and non-truck accidents was about the same.

As indicated, questions of skidding were the subjects of most of the papers. Prof. R. A. Moyer, Iowa State College, whose report last year on skidding tests was the cause of the emphasis put on skidding in this year's program, presented a further record of skidding tests, particularly on curves. Briefly, the report was an abstract of State College Bulletin 120, containing an account of all the tests so far made, which include (in addition to those reported last year, *ENR*, Dec. 14, 1933) further studies on frictional requirements for various driving conditions, particularly for braking and driving around curves. In respect to braking, the results indicate for reasonable safety a straight-skid coefficient of friction of 0.4 at 40 miles per hour under all conditions, and of 0.3 to counteract centrifugal force on curves.

Another continuation report was presented by K. W. Stinson and C. P. Roberts on coefficients of friction between tires and road surfaces. These further studies, supplementing the determination of last year for straight-

away rolling and for skidding, have produced a method for calculating theoretical stopping distances of automobiles by averaging the coefficients of friction on the basis of the square of the speed. The results point out the lower coefficients generally found at the higher speeds. Continued tests on vertical-fiber wire-cut lug-brick roads with asphalt filler have shown a continued decrease in both the maximum rolling and the sliding coefficients of friction due to the extrusion of the asphalt. In tests on snow, non-skid tires showed an advantage of 7 to 27 per cent over smooth tires at speeds between 20 and 40 miles per hour. Rolling coefficient for the 5-in. non-skid tire was 12 per cent better than for the 6.5-in. tire when stopping from 40 miles per hour; showed no difference when sliding. For smooth tires the 5-in. tire had an advantage of 8 and 14 per cent over the 6.5-in. tire for rolling and sliding, respectively.

The remaining four papers on friction and skidding were discussions on non-skid construction of concrete, tar and asphalt surfaces. Reporting on brick surfaces, Geo. F. Schlesinger, National Paving Brick Association, pointed out particularly that two developments in recent years have a direct bearing on the anti-skid properties of brick pavement surfaces: (1) the surface-removal method of bituminous filler application; and (2) the vertical-fiber lug type of paving brick. Tests indicate a high coefficient of friction on vertical-fiber brick surfaces, provided the surface is free of asphalt filler. The paper described the present methods of removing filler from the pavement surface and presented recommended specifications for such removal. Recent developments in the manufacture of vertical-fiber brick were discussed, relating particularly to lug location and design and deairing.

Discussing asphalt pavements, B. E. Gray, Asphalt Institute, pointed out that the tests reported last year had indicated that certain types of asphalt pavement had the highest coefficients of friction, while other types had the lowest. From this it was concluded that it was not the asphalt itself but rather the way in which it was employed that determined that the pavement was non-skid. A review of asphalt pavements and accident reports showed that improper cross-sections were to blame for many accidents. A contributing cause of skidding was the improper use of asphalt. Right design and carefully controlled construction operations will produce the non-skid textures desired. Briefly, this construction consists in bringing the mineral aggregates to the surface to provide friction.

In general, this same construction was the means proposed for skid resistance in tar roads by Geo. E. Martin, of the Barrett Co., but he pointed out that tar had non-skid properties due to its special ability to penetrate road aggregate.

In a report on the design of concrete surfaces to obviate slipperiness, E. M. Fleming, Portland Cement Association, concluded that concrete surfaces have coefficients of friction high enough for safety under general driving conditions due to certain inherent factors, such as uniformity of texture, permanence of surface conditions and low crown. More definite knowledge is, however, desirable, especially concerning the safe values for the two coefficients—first, that of impending skid, and second, that of sliding friction. It should be determined which of these coefficients is the critical one. The difference between the two values may also be of consequence. The investigation of coefficient values should include the production of various surface textures by different finishing methods. Mr. Fleming also stated that theoretical consideration indicated that a limit may be imposed on speed by the coefficients of friction.

ACCIDENT EXPERIENCE ALONG PORTIONS OF STATE HIGHWAY ROUTES 25 AND 26 IN NEW JERSEY IN 1933

Miles of Highway	Aver. Vehicles Per 24-Hr. Day	Million Vehicle-Miles Per Year	Million Vehicle-Miles Per Year in Daylight	Million Vehicle-Miles Per Year at Night	Day Accidents	Night Accidents	Day Accidents Per M.V.M.	Night Accidents Per M.V.M.
4.42 Lighted	32,000	51.625	30.975	20.650	96	54	3.10	2.61
6.52 Unlighted	8,800	20.942	14.450	6.492	35	50	2.42	7.70
2.27 Unlighted	8,400	6.960	4.800	2.160	10	19	2.08	8.80
3.90 Unlighted	8,400	11.957	8.247	3.710	23	28	2.79	7.55

Light essential to safety

Arguing that lighting is an essential part of a highway structure, Arnold H. Vey, New Jersey highway department, summarized day and night accident statistics from various sources and gave particularly the figures of accidents on a heavy-traffic New Jersey main road, parts of which are lighted and parts unlighted. The figures are as shown in the accompanying table and permit the general conclusion that the night-over-day accident increase is vastly greater on unlighted roadways.

A report by Prof. H. F. Janda and Wayne N. Volk, University of Wisconsin, presented results of tests of highway signs to determine promptness of reaction of some 160 drivers to various types of signs. The sign was placed 75 ft. away, and the time of reaction was determined by a chronoscope reading to a thousandth second. Two general conclusions were indicated: The first was that the arrow symbol for indicating "Turn" and "Curve" is without doubt the most effective way of warning a driver of such a hazard. A large arrow, regardless of the shape of the sign plaque, required a shorter time of reaction than any other type of sign. The standard Wisconsin "Turn" and "Curve" signs (having words and symbol on a diamond-shaped plaque) took slightly longer than signs having larger arrows, although they took less than signs which had only the words "Turn" or "Curve." Conversely, it may safely be said that words are the poorest way of conveying a message to the driver. To illustrate this, the standard "Stop" sign required a much longer time of reaction than any of the arrow signs, although it is probably the sign most familiar to the motorist.

The second conclusion was that the outline of the sign plaque is of little value to the motorist in indicating the danger ahead. This conclusion was supported by several observations; first, that the reaction times for the two outline signs were much greater on the first trial than the reaction times for any of the standard Wisconsin signs; second, that large arrows on square plaques required just the same time as similar large arrows on diamond-shaped plaques; third, that more incorrect reactions were made to the pure outline signs than to any other type; and fourth, that about 21 per cent of the questions in the questionnaire as to the shape of several common Wisconsin signs were answered incorrectly.

Low-cost roads

Following roadway safety as a leading subject was the group of reports on low-cost roads. Primarily discussion related to flexible surfacing, but soil stabilization was the subject of two of the six papers. Two of the papers were on laboratory control and two on specific field practices. Of the field-practice papers, one by M. H. Ulman, Pennsylvania highway department, described the now familiar construction of Pennsylvania land-service roads, of which nearly 20,000 miles were added to the state system four years ago. In this paper more is said than has been said before of the bitumen treatments that have been developed. There are three:

1. A light surface treatment of 0.25 gal. per square yard of primer and 45 lb. of stone chips, with 0.25 to 0.35 gal. per square yard of either cold or hot-surface-treatment bituminous materials.

2. An intermediate surface treatment of 0.25 gal. per square yard of primer and 65 lb. of stone chips, with 0.65 to 0.75 gal. per square yard of either cold or hot-surface-treatment bituminous materials applied in two treatments. The aggregate after the first application of cold bituminous material is dragged and

rolled. The additional required amount of aggregate is then spread, followed by the second application of either hot or cold bituminous material, rolled and followed by chipping and rolling.

3. A heavy surface treatment of approximately 100 lb. of aggregate and 0.80 to 1.30 gal. per square yard of bituminous material applied in four applications. The quantity of bituminous material used within the limits furnished is dependent on whether it is cold or hot-application material, as more of the cold-application material is necessary than the hot in view of less bitumen content. The treatment consists of placing approximately 70 to 80 lb. per square yard of aggregate, ranging from ¼ in. to 1½ in. in size, applying approximately 0.5 gal. of cold bituminous material in two applications, dragging and rolling. There is then applied an additional amount of bituminous material, followed by an application of ½-in. commercial chips and rolling. A fourth application of either hot or cold bituminous material follows, after which a small additional quantity of ½-in. commercial chips is spread and rolled. There is no primer required on the base for this type surface course, as sufficient bitumen is used to provide for both priming and coating the aggregate.

These surfaces on base courses of field stone, crushed stone or slag or gravel are costing from $6,000 to $9,000 a mile for 16-ft. widths.

Soil surveys

Stating that soil surveys are a required part of highway construction in Minnesota, F. C. Lang, state department of highways, described various methods practiced in gravel-base construction. These methods disclosed uncommon qualities only in the fact that design is more than usually a rational process based on soil surveys. Discussing organization Professor Lang said:

"Soil work is highly specialized and can be carried on successfully only by men who have made a special study of soils, and who are not burdened with administrative and unnecessary detail work. In Minnesota we have set up a special soils organization. In the main office we have an engineer of soils and a principal assistant. In the field, we have placed a soils engineer in each of the eight district engineers' territories. We are placing enough laboratory apparatus in the district headquarters so that routine tests on soils can be made at that point. The district soils engineers are responsible for the soil work in their districts. The district engineer advises these men where to work, as he best knows where improvements are going to be made; but the technical supervision is entirely furnished by the soils engineer. They report directly to him and are carried on his payroll. No improvements are made unless a plan has been prepared. The soils engineer at the central office is part of the division of tests, inspection and research. The work requires a special type of man who should have had a thorough education. It is desirable, if possible, to obtain men who have completed a regular engineering course, have had some experience and have taken graduate work on soils."

Studies of bituminous materials

The two laboratory papers were voluminous records of series of tests. Not much more than contents can be indicated. The report by T. E. Stanton, Jr., and F. N. Hveem, of the California highway department, presented records to demonstrate the value of careful laboratory control of materials used in low-cost bituminous pavements. The paper outlined the methods which have been adopted in California and discussed the various factors involved in the problem. It stated that the grading of aggregates may be judged by several unrelated criteria such as economy, permeability, workability, surface texture of finished pavements, oil demand and stability. Grading curves, with tolerance limits wide enough for average plant production, were given to show gradings that have proved satisfactory.

Formulas for determination of oil content, it was stated, involved surface-area analysis. The report described a method and gave a table of surface-area constants and curves. The surface area is multiplied by the bitumen index to get the amount of oil required. A bitumen index chart was shown with curves which apply for particle surface textures.

A machine has been devised to test the stability of bituminous mixtures. Deformation of the specimen results in pressure on a liquid. Laboratory tests with this "Stabilometer" have been correlated with pavement service. For susceptibility to moisture of oil roads, the laboratory uses modified procedures of methods developed by the Arizona highway testing laboratory. A water-asphalt preferential test has been adopted to determine the water-resisting properties of a filler to be used in a bituminous mixture. A swell test is used to determine the effect of water on oil mixes. This test is considered to be the most reliable to predict the effect of water on the road surface. The report described the types of road oils used in California and also the construction methods and equipment for both road and plant mixes.

The second report by Harold Allen and W. E. Gibson, of the Kansas highway department, related to the bituminous mat roads of Kansas. It described the research undertaken to determine the physical characteristics of mixtures of aggregates and road oil and the effect upon these characteristics of variations in the source of supply of the bituminous materials, the effect of changes in gradation of the aggregates, the relative values of different types of fines, the results obtained by variations in the amount of road oil used in the mixture, and methods of verifying the formula used for calculating the quantity of bituminous material necessary in a mat surface. Numerous tables of data and curves were included in the report.

The two soil-physics papers read by C. A. Hogentogler, Bureau of Public Roads, after describing progress in securing soil densities, concluded warningly:

"The effect of the size of the loaded area and of lateral flow upon deformations of the soil must be determined before the densities thus attained can serve as a quantitative measure of subgrade support. Nevertheless, the recently acquired ability so to prepare a soil that its maintenance at a fairly constant density can be assured should greatly facilitate the determination of the structural properties, which leads to the ultimate formulation of rules of procedure for the rational design of flexible road surfaces.

"In conclusion, however, let me point out that as yet we have no more than scratched the surface in this direction. What Mr. Proctor (*ENR*, Aug. 31 and Sept. 7, 21 and 28, 1933) has been able to accomplish by means of manipulation at optimum moisture content alone suggests that determination of the possible additional benefits to be furnished by supplementary methods of stabilizing the interfacial colloidal films by proper utilization of the bitumens, the portland cements, and the sodium, the potassium and the calciumions, comprises the most promising field of endeavor in the realm of highway research today."

A notable concluding paper of the soil group on methods and costs of peat displacement in highway construction, presented by J. L. Cushing and O. L. Stokstad of the Michigan highway department, will be abstracted in a future issue.

Various technical subjects

Of the papers on ungrouped subjects three were of exceptional magnitude. In a wide-flung statistical study of the effect of heavy motor vehicles on highway costs, F. Lavis, consulting engineer, arrived at the conclusion that widths, gradients and alignment of modern highways are determined almost entirely by the requirements of passenger automobiles. The presence of the heavier vehicles may require some additional thickness of pavement, but it is probable that this increased thickness may be economically justified by longer life and reduced maintenance. It may be justified by the requirements of private automobiles. In any event, the additional cost of this extra thickness for high-type pavements cannot be estimated to be over $2,000 to $4,000 per mile. So-called high-type pavements constitute only 4.2 per cent of the total highway mileage of the United States, and only part of these (probably only a small part) have a thickness of concrete of more than 7 in., or the equivalent thickness of high-class macadam.

A study of distorted concrete pavements in Kansas by Harold Allen, of the state highway department, was a compendious extension of the figures and construction data outlined in *Engineering News-Record, Oct. 11, 1934.*

A new investigation of the effect of grades on vehicle-operating costs, continuing work begun by Dean Agg more than ten years ago at Iowa State College, was reported voluminously by Prof. R. A. Moyer. Motor-vehicle power requirements on grades were studied in the laboratory by dynamometer tests. Conclusions of unusual interest were:

In conventional gear the average gasoline consumption, ascending and descending grades at a constant speed, increased uniformly with each per cent increase in grade above a level grade. In free-wheeling, a fuel saving was obtained when ascending and descending on grades between 1 and 5 per cent, at speeds less than 48 miles per hour, as compared to operation on a level grade at the same average speed. A maximum increase in gasoline mileage of about 20 per cent was obtained when operating in free-wheeling at 32 miles per hour on a 10-mile hilly course as compared to conventional gear. No advantage in gasoline mileage, when operating in free-wheeling as compared to conventional gear, was obtained at speeds greater than 52 miles per hour.

Engine resistance is an important factor in motor-vehicle operation on grades. It increases with speed and is greater in magnitude than air resistance for the average car. The over-all thermal efficiency of the average passenger car varies from 3½ per cent at 10 miles an hour to a maximum of 16½ per cent at 60 miles an hour. The over-all efficiency increases with an increase in load produced by operation on steep grades. The rate of change in efficiency increases with an increase in load.

For passenger cars operating in high gear at a constant speed, the savings in fuel costs resulting from reducing a 9 per cent grade to a 6 per cent grade were ten and four times greater than the savings in reducing from a 6 to a 3 per cent grade. Gentle rolling grades of 3 per cent or less should introduce only slight increases in fuel costs, and their use is, therefore, justifiable. For grades lower than 9 per cent, the time saving obtained from grade reduction is negligible for passenger cars but is an important factor in truck operation on grades steeper than 3 per cent.

Other papers read were "Vehicle Operating Costs as Affected by Road Surfaces" by Roblay Winfrey, Iowa State College, "Road Costs as Affected by Reconstruction" by Prof. C. B. Breed, Massachusetts Institute of Technology, and papers on traffic problems by W. A. Van Duser, N. W. Dougherty, W. S. Canning and B. D. Greenshields, and on materials by Paul Rapp, of the Bureau of Standards, and H. S. Mattimore, of the Pennsylvania highway department.

Letters to the Editor

Retrogression of Riverbeds

Sir—I read with much interest in your issue of June 28 Mr. Lane's excellent article on "Retrogression of Levels in Riverbeds Below Dams." His reference to the Colorado River reminded me that, in connection with some irrigation investigations on that stream in the spring of 1917, the question of the extent and effect of the constantly changing riverbed was given some consideration. The following comments are drawn from my field notes and memoranda of that date and refer to conditions as then observed and interpreted. The Colorado River in 1917 was exhibiting a marked aggrading tendency which had begun two years earlier. The best method of determining whether a river is aggrading or degrading is to compare gage heights over a series of years for a specific discharge, the riverbed itself being too irregular in cross-section and too subject to varying degrees of erosion or silting at any specific location to make identical comparisons possible.

The gage readings at Yuma, available from 1878 to 1917, showed for maximum readings a mean annual rise of about 0.16 ft. but a general reverse tendency from 1905 to 1915; and for minimum readings a mean annual rise of about 0.13 ft., with a similar reverse tendency for the period last stated. The low-water, gage-height retrogression from 1905 to 1909 was 1.8 ft., or an average of 0.45 ft. per year; but in 1910, following completion of the Laguna Dam about 20 miles above Yuma, there was a retrogression of 2.75 ft. The Colorado delta during the preceding forty years, with its mean annual accretion of 120,000 acre-ft. of silt, had extended itself about 6 miles into the Gulf of California. The mean competent gradient of the river between Yuma and the head of the Gulf, a distance of 102 miles, was about 1.2 ft. per mile, and a six-mile encroachment of the delta on the Gulf would mean an aggrading at Yuma of 7.2 ft., or an average of 0.155 ft. per year. This reasonably checks the gage height changes noted above.

It is evident that many elements intervened in the 40-year period to disturb the regularity of change in the riverbed regimen. The break into the Salton Sea well below sea level in 1905, with its accompanying grade recession, the diversion down the Bee River channel into Volcano Lake in 1909, which provided a shorter length of river, and the construction of the Laguna Dam all contributed, no doubt, to the retrograding tendency from 1905 to 1915. Volcano Lake, in 1917, was silting up rapidly, and it was anticipated that the aggrading tendency then operating would continue indefinitely or until some new river works, or some cycle of natural phenomena, again changed the physiographic conditions as then established.

Another note made at that time was to the effect that the river had been aggrading its bed for at least 40 years at a mean rate of about 0.15 ft. per year, and that as this aggrading continued the changing sectional area of the river channel would tend to vary this rate unless the river were held continuously between fixed levees. It would mean too, if the rate continued unchanged, that the levees would need to be raised at the rate of 15 ft. per century, that the continually rising riverbed and flood level would become an increasing menace to the adjacent lands, and that continually increasing expenditures would be required for protective measures. The moderating influences were that irrigation, both above and below Laguna Dam, would require storage, that this storage would greatly reduce the amount of silt carried by the lower river, and that aggrading would diminish with the clearer water that would result from the silt retention in the reservoirs above. Another moderating influence was the decreasing rate of deltaic projection into the Gulf of California on account of the increasing depth and width of water there encountered. Considering these influences and the fact that the levees can be maintained to a considerable height above the adjacent lands, it was evident that any serious obstacle to the continual improvement of that area, if it came at all, would be several centuries removed.

The actual effect on the lower river regimen of the Boulder and Parker dams, now under construction, will be watched with interest.

Seattle, Wash., Aug. 9, 1934. JOSEPH JACOBS, Consulting Engineer.

Consulting Engineers and Relief

Sir—On Nov. 15, I addressed a communication to Harry L. Hopkins, Administrator of the FERA, reading as follows:

No class of citizens has given more loyal support to make the New Deal successful than the consulting engineers of the United States. No class of men has added more in the past to the upbuilding of the United States than have consulting engineers.

There can be no possible doubt, however, that if the program which is alleged to emanate from the ERA and kindred relief organizations is put into effect, the consulting engineer will be as extinct as a dodo, almost over night.

Consulting engineers, in general, have, during the last few years, suffered greatly,

but they have held on by their teeth, uncomplainingly, looking for a happier day to arrive. They have given unstintingly of their time and effort and have delved deeply into their capital to maintain their organizations intact, thus helping to create conditions which would pull the country out of the depression and save their professional existence.

I am not of the school that whimpers because one is being slowly strangled to death, if the logic of the situation requires such a major operation. A recital of what is now being done clearly proves that such strangulation is inevitable. Many cities in the East have been visited by men representing the ERA or other kindred relief organizations working in some states with representatives of the stated department of health, and these municipalities are being urged to dig up projects, in particular those which will take three to five years to complete. They are promised that the engineering services will be furnished to them free for necessary preliminary work, and if the projects are found worthy, the government will undertake to construct such works with the proviso, however, that the government will have full authority, including engineering supervision.

How more effectively can the consulting engineer, with his years of experience be bowed out of the picture? If the best interests of the country demand his elimination, then, as a loyal citizen, I, for one, am bound to accept the inevitable. But, such a course, in my judgment, is not consistent with the best interests of the country, for it is an admission that the country will be in the throes of the depression for at least five years more, which sentiment, is the very antithesis of what is good and best for the upbuilding of the nation.

It would seem to me that any class of men who have given their lives for the upbuilding of the country, as have consulting engineers, should be accorded better and fairer treatment. I do not think it amiss to suggest respectfully that you invite the representatives of recognized engineering organizations to discuss this whole matter, in an effort to convince you and your advisors that such a course is not for the best interests of the country. I shall be glad to come to Washington to discuss this matter with you and your advisors face to face.

There can be no argument that you are impelled by the highest motives in putting men back to work, rather than handing out a dole, but the process must not be conducted along lines that will destroy the initiative, the thinking power and the accumulated experience of large bodies of professional men. In our desire to help in an emergency, we must not destroy that which is vital and necessary when the country is functioning normally.

The response from Mr. Hopkins' office does not go to the heart of the question which I raised in my letter. It is as follows:

> It is the policy of the several State Emergency Relief Administrations to undertake projects of the most value which may be handled by available help obtained from the relief lists but, in no event, to undertake any project which has the least possibility of being undertaken and financed through other sources. In addition to this, we are furnishing only such skilled and common labor as is available from the relief lists, it being necessary that materials and equipment be furnished by other sources.

I happen to know that money has been lavishly spent on such cities as Montclair, East Orange and Glen Ridge, in New Jersey, whose financial status is such that they are well able to take care of their own public works. When a protest was made to representatives of these towns that the cost of the improvement under ERA was many times what these municipalities pay for the same work done under their own administration, it was met with the response that it made no difference as the government was paying the bill.

I sent a copy of my letter to Mr. Hopkins to Mr. Eddy, President of the American Society of Civil Engineers, and to the Secretary of the American Society of Civil Engineers.

Mr. Eddy's reply would indicate that my charge was true against the state ERA, but that the FERA Washington organization is trying to cooperate with the engineers to prevent the catastrophy predicted in my letter.

The American Society of Civil Engineers seems to have confined its efforts to the Reclamation Bureau, and has succeeded in getting a promise to discontinue and refuse requests for all nongovernmental work that interferes with the practices of consulting engineers.

I am of the opinion that this whole matter should be tackled from a broader viewpoint, and I would suggest that *Engineering News-Record*, which has probably a wider field among the engineers of the country than any other medium, should use its very best efforts to prevent the impending catastrophy.

New York, N. Y., Nov. 30, 1934. ALEXANDER POTTER.

Partial Payments in Government Contracts

Sir—Beginning in your issue of Nov. 1, 1934, a new series of articles entitled "Advice for Contractors Entering Government Work" is most interesting, timely and instructive. How much more smoothly federal construction contracts would proceed if every contractor really understood the conditions under which he worked!

I should like to call your attention to an omission in the first article. This omission causes many misunderstandings, and in some cases, hard feelings, between the contractor and the engineer or inspector. The statement is made that the standard contract form provides that the government will make payments at the end of each month equal to 90 per cent of the amount expended in carrying on the work. This is not quite true.

The government does make partial payments on the contract, but these payments are based on the value of work satisfactorily executed in place. It does not include materials delivered to the site, nor does it include preparatory work. If concrete formwork cannot be paid for as built, it is quite a different thing from the statement that the government will pay 90 per cent of the money expended in carrying out the work. The cost of the forms is included in the payments for concrete work satisfactorily executed in place.

A carload of stone or marble cannot be paid for until it is actually made a part of the building. Structural steel, boilers and plumbing fixtures are only a few of the things that cannot be included in the voucher until they are "satisfactorily executed *in place*."

Monthly payments to contractors are based on the proportional value of the work in place in relation to the value of the particular branch as estimated by the contractor and the government engineer before any work is started. In other words, the contractor's price to the government is set up as 100 per cent and then broken down to the various branches (plastering, painting, etc.), so that each branch carries its own part of profit (or loss) bond, insurance, overhead and so on. This estimate is not changed except in case of addition or deductions that might be made as the work progresses. Thus a contractor's "cost" does not affect his payment except for work *"in place."*

Boston, Mass., Nov. 10, 1934. H. C. LONG,
Inspection Engineer,
U. S. Treasury, District Office.

Laying Off an Angle

Sir—The method of laying off an angle given by Robert E. Gohl in your issue of Aug. 23, 1934, p. 247, has the advantage of not requiring the distance from the transit to the point set, but the field work required for setting the points will not be so easy.

I prefer the method given by Milton R. Eva in your issue of Oct. 11, 1934, p. 473. I set my points and verniers very carefully, and the repeating of the angle is done with care. Also, I use a wide stake or hub so that there is space for shifting points.

The vernier is read for the first angle and taken down as a check; then when the number of repetitions has been made, the vernier reading is taken down and divided by the number of repetitions of the angle; this gives the degrees, minutes and seconds of the angle. The distance from the transit to the point set must be known, at least approximately. I have a prepared table that I take in the field with me that gives the amount of shift or right-angle offset for center tack on the hub for various distances and seconds. This amount of shift will be less than 0.05 ft. for a distance of 1,000 ft. and an angle of 10″. In running a random traverse line thus, the bearings are made to read to degrees and minutes only.

Ridgefield, N. J., Oct. 16, 1934. JOHN F. ROBISCH,
Registered Surveyor.

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Construction at Knoxville

WHAT the meeting of the Construction Code Authority and the Construction League at Knoxville last week demonstrated is this: That if the construction code is to become a living force to build a sounder system of construction activity, there must be both faith in the code itself and enforcement to give it reality. The entire industry must have faith in it as the agency of self-government rather than as a restraint arbitrarily imposed. As yet it lacks that faith. Enforcement also is lacking, and so long as this condition persists, the honest member of the industry will remain the victim of his less scrupulous competitors. Correction of this latter weakness waits on determined action by the National Recovery Administration. On the other hand, the task of awakening universal faith in code self-government of construction is the industry's own responsibility. Until all construction men come to full realization of what the code means for the future of their own activity and support the code with thorough conviction of its value, even the most effective enforcement cannot assure its success and revival.

Useful Missionary Work

THE DESIRABILITY of holding meetings of the construction code authorities out in the field was also made clear at Knoxville. Contractors in the surrounding states for the first time had personal contact with the national code officials, who are trying hard to administer the codes effectively. In turn, these officials obtained first-hand knowledge of the field problems of administration, and heard at close range many criticisms of code operations. A mutual understanding of great value developed between the field and headquarters. Each learned of the difficulties of the other. That the code and its operations are far from satisfactory was evident, yet suggestions were made and plans were presented that will have a far-reaching effect. Failure of enforcement is the code's chief weakness, emphasized by the handicap of lack of funds for proper administration. The correction of the non-compliance evil, promised by a member of the NRA board, will solve many of the difficulties confronting the administrators, including the lack of funds. The need of continuing education concerning the codes was also evident. More meetings in the field will help.

Highway Research Progress

RESEARCH KNOWLEDGE in highway engineering grows by accretion. In the unfolding years of activity of the Highway Research Board, the proceedings of whose fourteenth annual meeting are reviewed in this issue, no single discovery has claimed leading notice. But each year has seen a thin layer added to the pearl of assured knowledge placed at the service of highway transportation through the activities of the large company of laboratory and field investigators who make up the research board. Cumulative growth presents no dramatic moments, but in the count of years it takes on dimensions that represent revolution. This has been so with highway research, for which throughout a decade the Highway Research Board has been a center of crystallization. By this time research has made the road designer and constructor marvelously more certain of his handiwork. Withal highway research is today confronted with more and greater problems than have been solved in the past. Almost every discussion and report of the meeting reviewed in the preceding pages emphasized the want of fundamental principles laid down by research to solve pressing problems in highway engineering. The directors of the Highway Research Board have an inspiring duty to focus thought on these principles.

The Rule of Fairness

IN THE GREAT PRESENT TASK of restoring private enterprise to full vigor alongside of the public-works re-employment campaign, one critical question presents itself at the outset. Is government justified in carrying on activities that enter the field of business, and, if so, under what limitations? This is a key question today. The full answer has not yet been formulated but one essential principle is unquestioned. Speaking for manufacture, the Congress of Industry last week stated that where it is necessary for government to carry on business activities it must do so on a fair and thorough accounting of cost. Speaking for construction, Willard Chevalier, vice-president of the McGraw-Hill Publishing Co., said at the construction industry meeting at Knoxville, "When government enters the arena of business as a buyer or seller of the services of its citizens, it should enter that marketplace on exactly the same terms and under the same conditions that apply to private enterprise; it should set up no special rules." These statements re-emphasize the basic rule of fairness, without which business cannot long remain strong or sound. The rule has been too often honored in the breach within the past year. Once it is faithfully followed, doubts as to the proper range of government business activity will tend to disappear, for private enterprise and initiative need no more and can ask for no more to establish their claim to equitable opportunity and fair competition.

Below the Surface

GEOLOGICAL CONDITIONS in the valleys of streams frequently result in extensive subsurface flows. Understood and appreciated by geologists, this condition should not be overlooked by those communities which have developed surface supplies and subsequently find them inadequate in the normal process of expanding demand. The intercepting of the underflow of a stream from which the surface flow has been utilized may provide an economic supplemental supply, as in the case of Harrisonburg, Va., where an expenditure of $37,500 for a subsurface dam and collecting system developed 850,000 gal. per day, as described on another page in this issue. There is also the fundamental advantage that the use of underflow provides for complete development of a stream before another water supply resource must be sought. The possibilities for this type of inexpensive

development are relatively limited, but the logical extension of a surface supply by development of the associated underflow is worthy of study.

Steady Advance

EXAMINATION of the current trend of contract awards —for example, the curve of cumulative contract totals as published on page 777 reveals a remarkable condition. The curve is almost precisely a straight line for the entire year. It lacks not only the usual mid-summer sag but also the flattening of slope that always appears at the onset of winter. In other words, plans have gone to contract at a maintained, steady rate, regardless of seasonal influence. This fact is evidence of a persistent pressure to get construction moving, a pressure no doubt chargeable in the main to the activity of the Public Works Administration, but showing clear indications of another force. This other force, which counterbalanced the decline in PWA allotments, arises from the slow revival of private construction, both residential and industrial building. Confirmation is found in the report from labor headquarters that October and November employment in the building trades showed no decrease over September, an occurrence quite without precedent. Present indications warrant belief that revival of private construction will continue, and that re-employment and business recovery will advance in consequence. It should be well understood, however, that this rise cannot be sufficiently rapid to make up for the sharp decrease in PWA contracts that is in early prospect if Congress fails to provide additional funds. The present stability of employment in the construction field is highly valuable—it is the actual realization of what leaders in the construction field long have hoped for. But on the other hand the construction total is still so low as to leave some four million men idle who must be returned to work before construction can claim to be effectively in action for recovery. It is this great remaining margin of unemployment that must now be dealt with. The Administration's new construction program offers the way to do so, and it will succeed if planned skillfully and mobilized with real energy.

Toward Recovery

STRONGLY reassuring evidence came forward in the Congress of Industry meetings last week to show that a broad movement toward recovery is setting in. Uncertain and discordant though some of the discussions were the spirit of the meeting unmistakably expressed the general desire to go forward into new enterprise with determination, but yet under guidance of the new course-markers set by recent and current experiences.

The forward-looking spirit of industry was best expressed in the conclusion reached at the meeting that some form of industry control similar to that organized under the NRA should be retained at least for another year. It is a promising conclusion, even though an unexpected one. The year's attempt to operate under NRA codes has produced many disagreements and many undesirable results and it might have been expected that the proposal to continue trial of the system would meet general opposition, or at the very least lack of support. That the leaders of industry nevertheless are willing to go on with the attempt is proof of their purpose to attain recovery by advancing rather than by turning back.

Clearly, industry realizes that we must get away from the past system of hit-or-miss operation of industrial group activities. It has been strongly demonstrated that the units in each such group are interdependent. But whether practical recognition of this interdependence is best attained through a dictatorship like that set up by the NRA or through the much looser bond of a modernized industry association has yet to be determined. The old-time industry association, as Donald R. Richberg forcefully told the meeting, failed to measure up to the need, but a new and stronger association may succeed in accomplishing industrial coordination.

Which agency is to be the final one cannot be told on the basis of code experience to date, and it is for this reason that the further trial appears desirable. Some permanent improvement in the system of industry service must be brought about if we are to realize that approach to balance of production, consumption and surplus that we now know is essential to stabilization. Yet stability without competition would spell stagnation and decline. The improved system, therefore, must maintain the full virility of competitive effort; it must not stifle competition as do the price-fixing provisions of present codes.

In voting for further trial of self-government of industry, the meeting committed itself to the concept of better economic planning. It conceded that, though industry and business must always be individualistic, there are limits to the unrestrained freedom of this quality. The fact that the meeting in a separate resolution denounced attempts at economic planning is unimportant; its specific vote against economic planning merely recorded the manufacturers' disapproval—and surely a proper disapproval—of some of the overambitious efforts to which the stress of the recovery campaign has given rise. But the indictment lies more against some of the things that originated with industry than against actions of the government. The restrictions against enlargement of industrial plant and against free competitive price determination, which industry itself imposed, are more serious than such experimental ventures as the subsistence-homestead activities of the government.

It is apparent enough to everyone that attempts at economic planning must have narrow limits. Control of industry, whether by the government or by industry itself, may easily become fatal if it extends to repression of initiative or to guarantee of inefficient method or obsolete plant. Yet every man in industry knows that more facts are needed, such as better knowledge of demand and supply conditions, and that after such facts are obtained they must be used in planning.

Thus, industry itself now supports the purpose of economic planning and control—within proper limits. That this has come about as a result of a year's attempts at code operation represents a significant gain. What now remains, and this will be much the harder part of the job, is to define the limits within which planning and regulation are constructive, and what are the best methods for putting them into effect.

CURRENT NEWS

Code Authority Acts To Aid Industry in Local Integration

FAVORABLE action was taken by the Construction Code Authority at its meeting in Knoxville, Tenn., Dec. 5 to 7 on two reports submitted by the committee on joint facilities, through the executive committee, the first, setting forth a tentative program for the establishment and operation of local code councils, was accepted in principle and the executive committee was requested to develop the plan for reference to the localities interested in coordinating and consolidating administrative activities under the several divisional chapters. Financing of the plan remains to be developed, but discussions at the meeting indicated that several localities were already proceeding with joint administration by pooling the funds available to the different divisional administrative committees.

A report of the general meeting at Knoxville is given on p. 763 of this issue.

The code authority adopted rules and regulations for the establishment and operation of official joint bid depositories, and instructed the executive committee to place the plan in operation. It is applicable in any locality where several divisional groups have established independent bid depositories. It was proposed that the depositories would be supervised by a joint committee of the several divisions participating, and that a schedule of filing fees to be decided upon by the Construction Code Authority would support the operating expense.

Pursuant to a previous request to the divisional groups, it was reported that considerable information had been obtained relating to the operations of the competitive bidding practices of Article VII of Chapter I. The meeting directed that this material be analyzed and definite recommendations prepared, for amending Article VII to strengthen and improve operations under the code, to be considered at the next meeting of the authority.

The meeting considered a report prepared by the planning and adjustment board as to the disadvantages of the contractual definitions contained in nine of nineteen chapters of the code, particularly to the limiting of the application of mutual or area agreements for stabilizing labor rates in localities. The fact was emphasized that the basic code and nine of the divisional chapters contain a functional definition which embraces all operations in the classes of work defined; whereas nine other divisional chapters are limited to work of the type defined contracted for or performed for profit or for hire.

Internal problems considered

The meeting laid the basis for a solution of some internal problems. A more equitable plan was adopted for a two months period for the apportionment of the expenses of the Construction Code Authority among the several divisional groups. Further study is to be given meanwhile to the development of a permanent plan. A special committee was empowered to deal with the controversy between the divisional code authority for general contractors and the divisional code authority for mason contractors, and NRA was requested to defer its decision on the proposed change in the mason contractors' definition and on the methods of assessing members of a division performing work in another division until the committee had reviewed the facts and reached a decision as to the most equitable and workable plan.

The planning and adjustment board made important progress on the plan for regional boards and the modification of the procedure for establishing area agreements. It has proposed that the code be modified to permit several divisions by mutual agreement to effectuate a combined agreement to expedite the stabilization of labor rates. It was reported that in one of the Southern states, where special contracting is less intensely developed, the general contractors and employee groups have proposed a single area agreement covering all trades which is impossible under the present code provisions, but which is the most practical solution for that territory.

The planning and adjustment board gave consideration to a resolution presented at the open meeting of the code authority reiterating the demands by contractors in the Southeastern states for a reduction of the minimum unskilled labor rate from 40c to 30c. The board authorized the chairman to request the contractors in these states to appoint a representative committee to meet with the ten employee members on the board and review the entire situation in the hope of reaching a satisfactory solution to this important labor problem.

Building Trades Employment Rising Contrary to Usual Trend

Reversing the usual seasonal decline at this time of the year, employment in the building trades held steady during the month of November, according to figures released from the research department of the A. F. of L. Last month was the first November since the department was established in 1928, in which there was no decrease in employment. Between August and the first of November there was an increase of 40,000 union men employed in the building trades.

Commenting on these figures, President William Green stated, "Unquestionably, this gain reflects the efforts of the Federal Housing Administration to break the deadlock in the building industry. Since the FHA actually got under way, the trend has been upward, September showing a 2 per cent increase in building trade employment, and October an additional 2 per cent gain."

Legislation Planned For Federal Control of Stream Pollution

(Washington Correspondence)

FEDERAL control over discharge of sewage and industrial wastes into streams, lakes and coastal waters will be sought in legislation to be framed by a committee appointed by Secretary of War Dern. To foster cooperation it is expected that the bill which Senator Lonergan, of Connecticut, will sponsor, also will provide federal aid, probably in the form of long-term loans to cities and industrial plants which adopt methods of eliminating wastes or of converting them into by-products. A staff of engineers familiar with the complex nature of the problem would be maintained by the enforcement agency to furnish technical assistance.

The decision to seek legislation by Congress was arrived at by a group of federal and state officials in conference Dec. 6 with Secretary Dern and Senator Lonergan, who was instrumental in framing the Connecticut law. Advocates of federal control rely on decisions of the U. S. Supreme Court that tributaries of navigable streams constitute a part of such waters and are, therefore, subject to the jurisdiction of the federal government. They also hope that the Secretary of War's present authority to prohibit disposal of solid wastes in navigable streams can be extended to cover liquid wastes.

A canvass of more than 400 code authorities by NRA has disclosed only lukewarm interest in the subject. Returns are coming in slowly with barely 25 per cent of the code authorities covered having replied to date. In the majority, the claim is made that plants discharging wastes into streams already are doing their utmost to avoid pollution. The nature and extent of present methods are regarded, however, as far from adequate by the advocates of federal control.

The committee named by Secretary Dern to draft the bill is composed of Dr. M. M. Ellis, Bureau of Fisheries, R. E. Tarbett, chief engineer of Public Health Service, Thorndike Saville, National Resources Board, Sanford H. Wadhame, director of Connecticut Water Commission, Grover C. Ladner, chairman of water committee of Pennsylvania Conservation Council, and Dr. D'Arcy Magee, national vice-president of the Izaak Walton League.

To Seek Extension of TVA Power Into Northern Mississippi

The mayor of Greenville, Miss., plans to call a conference of representatives of cities and towns in the northern section of the state of Mississippi to draft a petition to President Roosevelt and the Tennessee Valley Authority to have TVA power extended into that area.

Reclamation Group Annual Meeting At Salt Lake City

WITH an attendance of more than 200, the third annual conference of the National Reclamation Association was held in Salt Lake City Dec. 7-8, with discussion centering on reclamation as a national policy and the present status of the federal program. A feature of the meeting was an address by Dr. Elwood Mead, commissioner, Bureau of Reclamation, who emphasized the need for the establishment of definite long-time planning for irrigation and correlated power development. Marshal N. Dana, Northwest representative of the PWA, was re-elected president of the association.

Resolutions passed at the meeting referred to the necessity for extension in the national program of stream gaging as carried on by the U.S.G.S., the need for refunding of irrigation district bonds and the continuation of the PWA program as it affects reclamation activities.

Address by Dr. Mead

The scope and program of reclamation under the present administration, according to an address presented by Commissioner Mead of the Bureau of Reclamation, has been coordinated into a national conservation plan as distinct from the development of separate unrelated projects, as was frequent in the past. With the aid of PWA financing, the Bureau of Reclamation is now constructing 17 reservoirs in eleven western states and completing distribution canals which will augment the scanty water supplies of many irrigated areas. He emphasized that the work of reclamation during the past few years has been devoted principally to rescuing distressed irrigated areas which have inadequate water supplies. These agricultural areas are essential in maintaining many important western communities. He expressed concern over the continued popular fallacy that present reclamation activity is putting new land under cultivation.

On the subject of planning, Dr. Mead pointed out that water supplies in western streams are strictly limited and that planning must be done in such a way that development will be coordinated for the best ultimate plan. He recommended that irrigation and power development be studied and programmed together. "We need a definite power policy and we need an irrigation program, not only for single states, but for all the states along rivers like the Columbia, the Colorado and the Platte."

Contract Awarded for Cement For Colorado River Aqueduct

The joint bid of four southern California cement companies for the 5,000,000 barrels of bulk cement for the Colorado River aqueduce project was accepted by the Metropolitan Water District upon the recommendation of F. E. Weymouth, general manager and chief engineer. The unit bid of the California Portland Cement Co., Monolith Portland Cement Co., Riverside Portland Cement Co. and Southwestern Portland Cement Co. was $1.40 for the 5,000,000 barrel schedule.

Boulder Dam Storage for Arizona To be Argued Before Sec. Ickes

The proposed contract between the state of Arizona and the federal government for 2,800,000 acre-ft. of storage space in the Boulder Dam reservoir and half of the power output from the Parker Dam plant will be discussed before Secretary Ickes at a meeting in Washington, December 17. According to announced plans, Arizona has been allotted one hour to present arguments in behalf of the contract and the six other states of the Colorado River basin, who are protesting the contract, will be allotted two hours.

Scioto-Sandusky Water District Approved by Conservancy Court

The seventeen judges from the central counties in Ohio extending from Lake Erie to the Ohio River, along the area of the proposed conservancy district, have approved the plan for the Scioto-Sandusky Conservancy District. The court also appointed three conservancy commissioners who will go to Washington and lay the plans of the district before the PWA for negotiating federal financing.

The present tentative program of the conservancy district proposes reservoirs on the Sandusky River at Tiffin and Upper Sandusky, on the Scioto River near Bellepoint, on the Olentangy River above Worthington and Delaware, on Darby Creek above Harrisburg, on Deer Creek west of Williamsport, on Paint Creek west of Bainbridge, on Rocky Fork west of Paint Creek, on Salt Creek east of Richmond Dale, and a diversion channel which will connect the Scioto and Sandusky Rivers.

The total estimated cost of the ultimate project is about $35,000,000. The conservancy court estimated that the government would furnish about $24,000,000, with the state contributing $5,000,000, and the remainder to be paid by the seventeen counties in the district.

Gas Tax Diversions for Relief Held Unconstitutional in Ohio

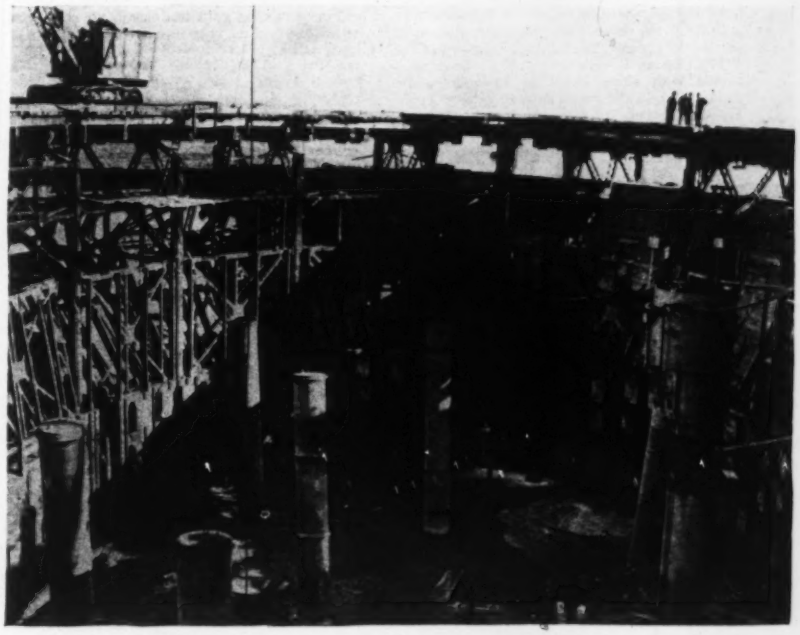
A law diverting part of the Ohio state gas tax revenues for poor relief has been held unconstitutional by the state supreme court in a ruling which states that the legislature failed to recognize poor relief diversion from the gas tax fund when it re-enacted the gasoline tax law last year. In 1933 the Ohio legislature re-enacted the state gas tax law, reducing the levy for highway purposes from 2 to 1½ cents per gallon; the additional half cent was diverted to aid schools, but no provision was made in the law for diversion for relief.

The recent poor relief diversion statute was questioned as to legality in a taxpayer's suit, asking an injunction against the diversion. The Ohio Supreme Court sustained the lower court in its finding that there was no authority in existing law for diversion of the revenue for relief work.

FENDER FOR SOUTH PIER OF GOLDEN GATE BRIDGE UNWATERED

Inside of the fender ring of the south pier for the Golden Gate Bridge after unwatering on Dec. 2. The concrete surface exposed is the seal placed by tremie extending from rock at El. −100 to El. −35. Seven of the eight 4-ft. diameter inspection wells are shown. These wells lead down to semi-spherical chambers 15 ft. in diameter which make the rock foundation accessible for inspection.

The south tower of the bridge will rest on a pier built on this seal. The first pier concrete to be poured in the dry was placed Dec. 6 and the pier is to be ready for steel work Jan. 1. By an air lock, shown on the inspection well at extreme right, and air pressure of 50 lb. per sq.in., these wells are kept unwatered for inspection of the foundation rock after they have been pumped out.



West Virginia Announces a Challenge to Federal Control of Water Power

WEST VIRGINIA, through a communication forwarded by the state attorney general to the Federal Power Commission, will challenge the constitutional right of the United States to supervise water power developments within the state. The action will be taken by intervening in the present suit of the United States government against the Electro Metallurgical Co., in which the government is endeavoring to force the company to accept a federal license for its $11,000,000 Hawks Nest hydroelectric project on New River in West Virginia.

The states attorney, in his letter, stated that West Virginia did not question the right and power of the United States to protect the navigable waters of the country, but believed "that the federal water power act goes much further than is either necessary or proper for the exercise of that admitted power of the United States, and, in fact, attempts not to protect the navigable waters of the United States, but to usurp, or seriously encroach upon, the sovereign power of the state of West Virginia to control and supervise the development of water power within the state."

Commission's position

In reply, Oswald Ryan, general counsel of the Federal Power Commission, stated that "It is the position of the Federal Power Commission that every right of the state is fully preserved by the federal water power act and the commission's license issued thereunder, including the state's right to tax the project property, collect royalties upon the electric energy developed therefrom, and to expropriate to the state treasury any excess profits from the power. The commission further holds, however, that the paramount authority of Congress under the constitution, to protect and improve navigation, makes valid the provisions of the federal license which have for their purpose the protection and improvement of navigation and interstate commerce and the protection of the interests of the public of West Virginia, as well as the people of the United States."

Arguments in the Hawks Nest case are scheduled to be held in the United States district court for the Southern District of West Virginia on Jan. 7.

New York State Commission Approves 56 Grade Separations

Approval of a list of 56 railroad grade crossing elimination projects at a total estimated cost of $55,334,200, has been announced by the Public Service Commission of New York for consideration during the year 1935. The list includes nine new projects and 47 carried over from the program of the current year. Several of the projects involve elimination of more than one railroad track crossing. Two of the new projects are in Buffalo and involve an estimated cost of about $600,000.

Seattle Contractor Violates Code And Loses Paving Award

A $185,000 paving contract in Seattle has been ordered cancelled by the NRA, and PWA funds for the project withdrawn as the result of an alleged code violation, with the contractor accused of being guilty of bid peddling. The contract was held by the Northwest Paving Co., Seattle, and the work was to consist of highway construction north of the city. Orders cancelling the contract were received from Washington, D. C., by the local compliance director, and as a result of the cancellation of the contract, the state highway department is reported preparing to call for new bids.

Buffalo to Appeal Decision Against Improving End of Canal

The business and shipping interests of Buffalo, N. Y., are preparing to appeal from an adverse decision of the review board of the U. S. Engineers on the proposed improvement of the barge canal from Three Rivers to Buffalo. The Corps of Engineers had previously decided in favor of the waterway improvement from Oswego to the Hudson River and against a corresponding improvement for the western section of the canal from Three Rivers to Buffalo on the ground that there would not be sufficient value in this latter improvement to justify the cost. The governor has already signified his willingness to accept federal funds for this improvement work from Oswego to the Hudson River, regardless of the decision which may be made on the western end of the project.

PLANETARIUM DOME OF CONCRETE SHELL TYPE NEARS COMPLETION

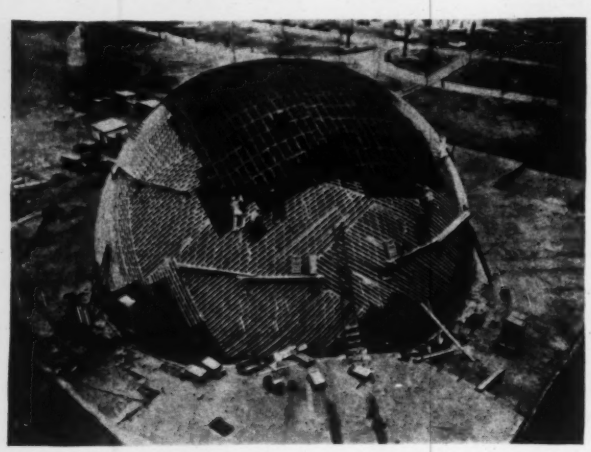
A SINGLE warm day, permitting the placing of the last hundred square feet of concrete, will bring to completion the 80-ft. diameter hemispherical concrete dome of the new Hayden Planetarium being built in New York City for the American Museum of Natural History. The largest planetarium in this country, this structure will also be the first to utilize the concrete shell type roof used for planetarium domes in Europe.

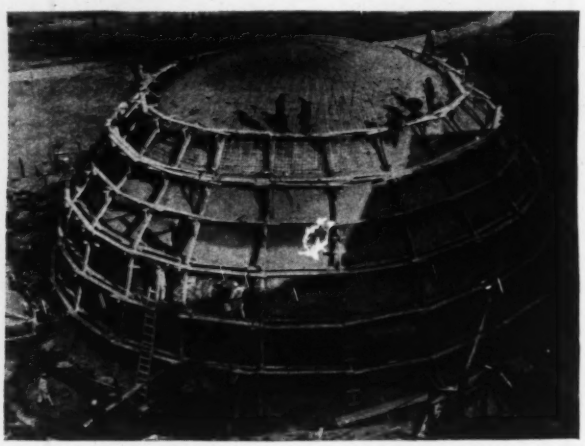
From 9 ft. above the spring line the dome of the Hayden Planetarium, comprised of 1:3½ Gunite, is only 3 in. thick. It is reinforced with three layers of ¼ and ⅜ in. rods. Conforming to the so-called Zeiss-Dwidag system (*EN-R*, April 14, 1932, p. 537) the dome is calculated as a curved plate supported by a stiffened rim, an assembly that acts as a beam and not as an arch and in which all transverse bending is eliminated from the shell. Thus, below the 9 ft. elevation, referred to above, the thickness increases to 12 in. at the base where it merges with the stone concrete roof of the building which serves as a stiffening ring to resist any deflections in the shell and to take care of secondary stresses from any cause

The dome has been built on a novel system of self-supporting centering (left view below), consisting of circumferential rings of pipe carrying 2x12-in. plank set on edge and curved to the radius of the dome. To this centering workmen applied 1½-in. slabs of rock cork which serve both as interior insulation of the dome and as a backing against which the Gunite could be shot (right view below). Outside insulation will consist of 1½ in. of Nailcrete which will be sheathed with 16 oz. copper sheets.

Inside the structural dome, a stainless steel dome 75 ft. in diameter will be hung on which the stars and other heavenly bodies will be projected from a machine mounted on a track in the center of the floor. The stainless steel dome, to be fabricated by shot welding, will be perforated with thousands of fine holes through which the sound of the lecturer's voice will pass to be absorbed by the cork.

The architects for the Hayden Planetarium are Trowbridge & Livingston. Weiskopf & Pickworth are structural engineers and the White Construction Co. is the contractor for the work.





Washington Notes

By Paul Wooton
Washington Correspondent

THE NRA is making vigorous moves to straighten out the code budget tangle. These budgets, accompanied by plans for assessments on units in each industry, are the means of taxing business for upkeep of code authorities. While most budgets, under code rules, demand approval and audit by NRA, information on their creation and on expenditures of funds collected has been meager. NRA doesn't even know the total dollar volume of budgets it has approved to date, beyond the fact that they run into hundreds of thousands of dollars. Some 600 have been approved; only one has been audited.

Under Hiram Brown, formerly with RKO Corp., and now special assistant to the NRA Administrative Officer, W. A. Harriman, the Recovery Administration is mapping a detailed program for checking up on code expenses. Latest step is the issuance of an executive order calling for audits and periodic reports both to NRA and to the companies paying code assessments. Segregation of code authority funds from other monies is likewise provided.

Trend to limit codes

A strong trend is developing currently within NRA for addition to the Recovery Act of concrete provisions limiting the scope of code provisions. This view is rapidly replacing earlier beliefs that the law should be extended by Congress in virtually its original form. The desire for definite restrictions in the act has taken form as a result of NRA's detailed study of conflicting code provisions. Elaborate charts proved that the present 500-odd codes are virtually unenforceable in anything like an effective manner. While the study was designed for the purpose of simplifying codes and making those for related industries more uniform, officials admit that there is ample precedent to show that industry will oppose any move for mass code revision.

There appears, then, only one solution of the problem. Objectives which cannot be obtained administratively, could be enforced under the Recovery Act, if the latter is made more specific. The much praised flexibility feature of the present law has resulted in an inflexible administrative set-up.

Definite limits in the permanent law on what features of business activity can be allowed in codes, might open the way to definite limitations on price and production control and variation in wage and hour regulations, to say nothing of numerous special rules on such matters as overtime work and accounting methods. On the matter of hours, the NRA trend is centering more and more around the 40-hour week, now provided in most codes, as against labor's 30-hour demands.

PWA funds in doubt

Until President Roosevelt submits his recommendations to Congress Jan. 3, any estimate of the extent of the public works and relief program is only a guess. Most of the reports of plans for huge expenditures, which have been current in Washington for weeks, are mere proposals which have no backing at the White House. Secretary Ickes has not sought to discourage such speculation, but since they returned with the President from Warm Springs both Secretary Ickes and Harry Hopkins, FERA administrator, have been non-committal, except for the latter's statement that he does not expect any increase in the amount of work relief. A canvass by FERA indicates that among the 4,300,000 families now on relief, there are 4,500,000 unemployed "employable" individuals. About 2,000,000 of these now are engaged in some form of work relief.

Ickes' views on public works

Secretary Ickes said his ideas on continuation of public-works program are "deeply buried" in his own mind, and that there will be no announcement on housing until a policy is finally determined. A delegation representing the U. S. Conference of Mayors called upon him Dec. 11 to urge expedition of public works and housing projects as the best means to aid recovery. Paul Bettors, secretary, stated that the mayors will carry their demand for continuation directly to Congress if the Administration does not propose a public-works program.

"We came here to tell the federal government what would happen if it does not do something," said Daniel W. Hoan, of Milwaukee, president of conference. Secretary Ickes said that the mayors did not discuss with him their proposal for the government to buy non-interest-bearing municipal bonds to finance local projects. "This doesn't concern PWA any more than the sale of municipal bonds on the open market," Ickes remarked, as such transactions would be handled by the Treasury.

Regarding criticism concerning retention by PWA of the premium at which some municipal bonds have been sold, Ickes said that borrowers from PWA had always been permitted to sell their own bonds, but when PWA buys their bonds, the bonds belong to PWA. Questioned concerning grade-crossing elimination projects, Ickes said they would furnish a "good outlet" for PWA funds, but that PWA would prefer to make the selection.

St. Louis Building Contractors Ask Protection Against Bombing

Members of the Allied Building Contractors Association of St. Louis have addressed letters to various law enforcement officers in St. Louis County requesting protection against the bombing of buildings constructed by members of the association. The letters assert that a number of prospective home builders in the county have deferred construction for fear that the buildings would be bombed before they were completed.

There have been a number of buildings bombed during recent years, according to reports, which were constructed under the open shop plan in St. Louis County, but there have been no convictions. The letter addressed to the law officers stated that more than 50 per cent of the contractors and building workmen in St. Louis County are not affiliated with the American Federation of Labor, and it is contended that the bombings which have occurred have been directed against these contractors.

PWA Allots Funds for Study of Pollution on Potomac River

An allotment of $25,000 has been made by the PWA for a study of pollution on Rock Creek, a tributary of the Potomac River, to be undertaken by the National Park Service. This survey and the consideration of a comprehensive plan for improving conditions on the Potomac River are closely related to the PWA loan and grant of $4,000,000 for construction of the sewage disposal plant at Washington, D. C. The program for reducing pollution in the lower reaches of the river, it is contended, will be relatively ineffective if upstream pollution continues.

Rock Creek drains an area of about 75 square miles in the District of Columbia and state of Maryland. There are about 25 communities in Maryland which contribute pollution to the creek.

Denver Creates Flood Control District To Carry Out Cherry Creek Project

THE Denver flood control project to control the menace of flash floods originating in the Cherry Creek watershed advanced another step toward the construction stage when city officials last week took legal steps to create the local Cherry Creek Flood Control Improvement District. Property owners are given until Feb. 6 to register protests, after which the city manager of improvements and parks will order start on the work with the call for bids expected in about three months.

The work will consist of building an earth-fill dam across Cherry Creek about 6 miles southeast of the city. The cost of the dam is estimated at about $800,000, and 35 per cent of this cost will be financed by general city and county obligation bonds. An issue of $295,000 of these bonds has already been approved by the voters, and $118,000 were sold several weeks ago to cover preliminary engineering costs. The PWA offered to take these bonds at 4 per cent interest, but later granted permission for a public sale to permit the city to obtain a lower interest rate.

The newly authorized improvement district, now in the course of organization, will bear 35 per cent of the cost through improvement-district bonds, and the remaining 30 per cent will be the usual PWA grant, for which $204,000 has already been allocated.

Construction of retaining walls within the city to provide a definite channel for Cherry Creek is already under way as a separate project. Ordinarily the stream is small, but it occasionally has severe flash floods as the result of a large catchment area which is subject to severe local cloudbursts. On these occasions the creek has overflowed and caused serious floods in the city. This condition was emphasized last year when a severe flood carried away the Cottonwood Dam (*ENR*, Aug. 10, 1933, p. 174), resulting in heavy damage in Denver.

Third Low-Cost Housing Project Announced for Chicago

The PWA slum clearance and low-cost housing program for the city of Chicago now includes three projects, the last being announced this week. This newest project on the North Side will cover 70 acres and cost about $12,500,000. The condemnation proceedings filed against the property in Federal District Court in Chicago by the Department of Justice, named an area bounded by Division St., Halstead St., Ogden Ave., Blackhawk St., Hudson Ave., Sigel St., and Sedgwick St. This area is about one mile north of the Chicago loop and one-half mile from Lincoln Park, adjacent to the Field Garden Apartments, a private housing undertaking. It is the first time one of the projects on the PWA low-rent housing program has been located adjoining a private development, to continue the reclamation effect of good housing in a blighted area.

Construction of the three Chicago low-rent housing projects will provide homes for upwards of 6,900 families. The first project, known as the Southwest project will provide dwellings for around 3,000 families, while the South Side project will accommodate upwards of 1,400 families. The North Side project is planned for 2,500 families.

Garbage Disposal Through Sewers To Be Extended at St. Louis

Following extensive experimental work extending over a period of six month, the city of St. Louis will expand its present program of garbage grinding and disposal through its sewerage system. The city administration has approved the transfer of $20,000 to permit purchase of a second grinding machine with a capacity of 200 tons per day and accompanying facilities. The director of streets and sewers, who has been carrying on the studies, has requested $35,000 in the forthcoming budget to permit installation of two additional machines of similar capacity in other sections of the city.

Savings estimated up to more than $80,000 per year are expected with the new system of disposal. As a result of the experiments, those in charge of the work report that there are no objectionable odors or river pollution in the new system. The garbage collections of St. Louis range from 100 to 150 tons during the winter months, up to 400 tons during the summer period.

SOCIETY CALENDAR

AMERICAN ENGINEERING COUNCIL, annual meeting, Washington, D. C., Jan. 10-12.

AMERICAN ROAD BUILDERS, annual convention, Washington, D. C., Jan. 22-25.

AMERICAN SHORE AND BEACH PRESERVATION ASSOCIATION, annual meeting, Washington, D. C., Jan. 10.

AMERICAN SOCIETY OF CIVIL ENGINEERS, annual meeting, New York, Jan. 16-18.

AMERICAN WOOD-PRESERVERS ASSOCIATION, annual meeting, New York City, Jan. 22-24.

AMERICAN WATER WORKS ASSOCIATION, annual convention, Cincinnati, Ohio, May 6-10.

CANADIAN CONSTRUCTION ASSOCIATION, annual convention, Montreal, Que., Jan. 29-31.

NATIONAL PAVING BRICK ASSOCIATION, annual meeting, Indianapolis, Ind., Feb. 7-8.

Palmer C. Ricketts Dies; Head of Rensselaer Polytechnic

Palmer C. Ricketts, president and director of Rensselaer Polytechnic Institute, Troy, N. Y., died at Johns Hopkins Hospital, Baltimore, on Dec. 10, at the age of 78. He had been ill in the hospital for several weeks.

At the time of his death Dr. Ricketts had been a member of the faculty of Rensselaer Polytechnic Institute for nearly 60 years, having joined the teaching staff following his graduation in 1875, and had been the active head of the institution for the past 42 years, first as director from 1892 to 1901 and then as president and director.

Palmer C. Ricketts

In the latter capacity he was instrumental in rebuilding the school following the disastrous fire of 1904 which left it with only three small buildings. Now the school has a large group of buildings valued at over $10,000,000 and the number of students has increased from a few hundred at the time of the fire to over 1,700 in 1931.

Dr. Ricketts was born in Elkton, Md., in 1856, studied in a private school at Princeton and graduated from R.P.I. in 1875. In addition to his teaching he acted as a consulting engineer during the years previous to his appointment to the position of director of the Institute. He had been active in the affairs of the American Society of Civil Engineers for many years and was elected an honorary member in 1931. He also was a member of the A.S.M.E. and the A.I.M.E., also the Institution of Civil Engineers, Great Britain.

Railway Materials Exhibit Planned for AREA Convention

After a lapse of five years, manufacturers of railway appliances and materials are planning to present an exhibit in connection with the annual convention of the American Railway Engineering Association to be held at Chicago, Mar. 11 to 14, 1935. The exhibit will be held under the name of the National Railway Appliances Association.

Brief News

THE ILLINOIS PWA office on Dec. 1 reported 22 projects completed and 70 under construction out of a total of 121 now under contract.

CONTRACT for construction of a $58,000 sanitary sewer system was awarded by Port Lavaca, Texas, to Brown & Root, Houston contractors. The work will be financed by a PWA loan and grant.

BUILDING PERMITS in Jacksonville, Fla., during November were the highest for any month during the current year and the aggregate for eleven months in 1934 was about $500,000 ahead of the same period for 1933.

PLANS for the $15,000,000 storm water drain and sanitary sewage program at Buffalo, N. Y., have been approved by the state PWA engineer, and the mayor and commissioner of public works have conferred with PWA officials in Washington on financing arrangements.

RESIDENTIAL and other small water consumers of San Francisco, numbering more than 80,000, received a 10 per cent reduction in water rates on Dec. 1. The monthly reduction for residential service will range from 10c. to 70c. with the rate now in effect.

LEVEE WORK in the New Orleans district of the Mississippi River work during the month of October totalled 4,195,000 cu.yd. or nearly 330,000 cu.yd. more than the work done during the month of September.

RESIDENTIAL construction in England during the twelve months ending September, 1934, showed 250,000 houses privately built, which is a 53 per cent increase over the previous twelve months period and almost double the total in the preceding two years.

Personals

H. W. BROOKS, engineer, serving as assistant director of the electric rate survey being conducted by the Federal Power Commission, resigned Dec. 1 to return to private consulting practice.

ALEX M. TORPEN, San Francisco, Calif., has been appointed engineer in charge of construction for the Pickwick Dam to be built by the TVA on the Tennessee River. During the past twenty years he has had extended experience in dam construction operations in the United States and many foreign countries.

J. L. JACOBS, with the expiration of his appointive term as county assessor of Cook County, Illinois, has resumed active participation in and direction of the firm of J. L. Jacobs and Co., consulting engineers rendering service to governmental agencies and to financial and business establishments on problems of taxation, administration, system and fiscal reorganizations.

Obituary

ALBERT VAN WAGNER, former superintendent of public works at Syracuse, N. Y., and contractor in that city, died at his home Nov. 25.

J. W. ROBERTSON, age 42, construction engineer for the Louisiana State University, died Dec. 1 of injuries received in an automobile accident.

FRANK W. JANSKY, division engineer

of the C. B. & Q. Railroad, with a record of thirty years' employment in that company, died at his home in St. Louis Nov. 26, at the age of 63.

JOHN V. FITZGERALD, formerly superintendent of streets for Revere, Mass., died Dec. 10 at the age of 65. He had been connected with the public works department for many years.

WALTER KELTON WILEY, head of the Wiley & Foss Construction Co., Fitchburg, Mass., died in that city Dec. 9 after an illness of six weeks. He was 67 years of age and had been connected with the firm and its predecessor organizations for about 40 years.

SYLVESTER NILES WILLIAMS, professor emeritus of civil and sanitary engineering, Cornell College, Mount Vernon, Iowa, died Oct. 24, at the age of 83. He was a graduate of the first class from Cornell University in 1873, and was instrumental in establishing the engineering department at Cornell College in Iowa, which had previously been exclusively a school of liberal arts. He was professor of mathematics in the school from 1872 to 1873, then professor of civil engineering for ten years, and head of the civil and sanitary engineering department for the next thirty years, retiring in 1913. He was an early president of the Iowa Engineering Society.

GEORGE H. CLARK, well-known construction engineer in the New York metropolitan area, and at one time chief engineer for the Holbrook, Cabot & Rollins Corp., died Dec. 7 in New York City, at the age of 63. He graduated from the Columbia School of Mines in 1893, and after several years work in street railway and highway construction joined the staff of the old Rapid Transit Railroad Commission and was in charge of several sections of subway work. In 1909 he became chief engineer of the Holbrook, Cabot & Rollins Corp., and in this capacity was in charge of the difficult subway work of connecting the old and new lines in the Times Square area. Subsequently he served as vice-president of the Gotham Construction Co.

FREDERIC M. FAUDE, vice-president of the Loveland Engineers, Inc., San Francisco, died in that city Nov. 28 at the age of 58. He was a graduate of the University of Minnesota, and after spending ten years in the engineering organization of the Northern Pacific Railway served on several Bureau of Reclamation projects. Later he confined his engineering activities to the state of California, acting as engineer for the Cuyamaca Water Co. and the Cardiff and San Luis Rey Irrigation Districts in San Diego County. He then served as chief engineer of the hydraulic division of the State Railroad Commission, before joining the staff of the Loveland Engineers, Inc.

CONSTRUCTION STATISTICS OF THE WEEK

ENGINEERING construction awards at $28,858,000 are 10 per cent over last week and a 12½ per cent increase over the average week in December last year. This total is made up of $22,080,000 in public and $4,799,000 in private work. The public work represents $1,979,000 in federal and $22,080,000 in state and municipal awards.

The big gain for the week is all in waterworks due largely to contracts let by the Metropolitan Water District of Southern California. Waterworks awards for the week total $10,026,000; highways, $6,033,000, a slight rescission from last week; public buildings, $3,112,000; commercial buildings $1,812,000; industrial buildings, $1,329,000; sewerage, $1,139,000; earthwork irrigation, drainage and waterways, $1,529,000 and bridges $1,750,000.

The larger contracts include: Steam power plant for Colgate-Palmolive-Peet Co., Jersey City, N. J., $500,000; highway awards by Texas, $2,421,000 and by Oklahoma, $468,000; painting, East and West Bay Crossings of San Francisco-Oakland Bay bridge, Calif., $835,000; water treatment plant, Springfield, Ill., $364,000; cut and cover siphons, outlet channel and appurtenances, Colorado River Aqueduct, Metropolitan Water District, Los Angeles, Calif., $1,740,000; cement for Metropolitan Water District, $7,000,000; sewers and sewage treatment plant, Iowa City, Iowa, $375,000; Tappan Dam, Dennison, O., $387,000; and 38 miles or more railroad along Levisa River, Buchanan Co., Va., for Norfolk and Western Ry., estimated at $1,500,000.

New capital for the week includes $2,485,000 in municipal bond sales, more than offset by reductions in outstanding PWA allotments of $8,575,000.

CONTRACTS

(Thousands of Dollars)

	Weekly Average Dec. 1933	Prev. 4 Weeks	Week Dec. 13 1934
Federal Government	$5,132	$6,959	$1,979
State and municipal	12,241	15,125	22,080
Total public	$17,349	$22,084	$24,059
Total private	8,267	3,219	4,799
Week's total	$25,641	$25,303	$28,858
Cumulative to date:			
1933	$1,018,713	1934	$1,232,540

NEW PRODUCTIVE CAPITAL

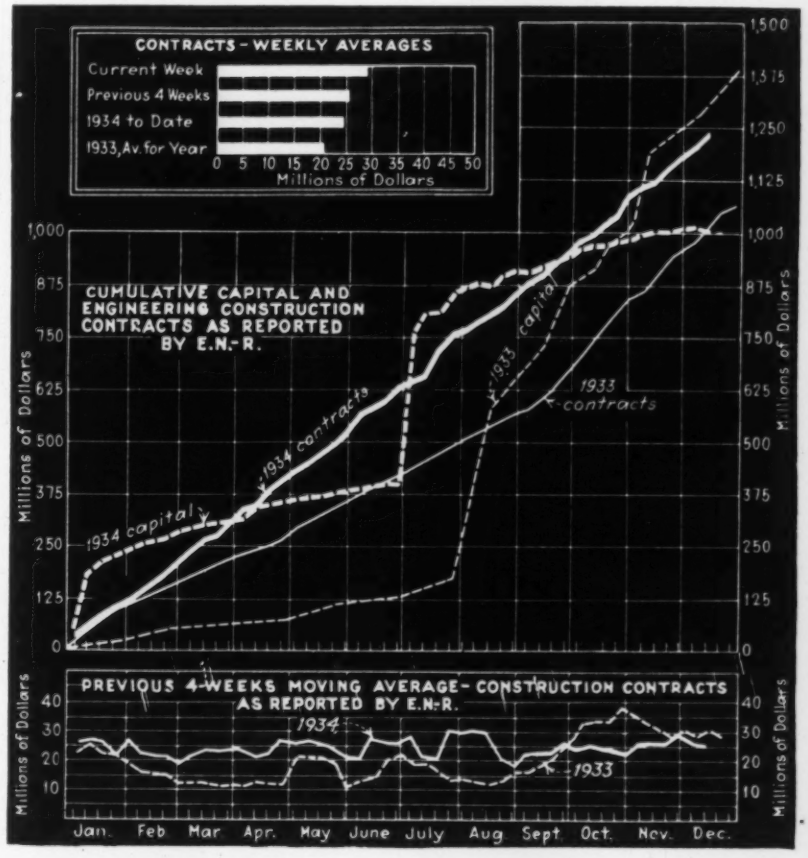
(Thousands of Dollars)

1934	Week Dec. 13	Cumulative
State and municipal	$2,485	$331,739
PWA allotments, S&M.	—8,575	580,259
RFC loans, S&M	....	23,140
Corporate issues	....	21,860
PWA allotments, private	60	53,478
Total, Non-Federal	—$6,030	$1,016,476
PWA allotments, Federal Constr	169	193,859
Total new capital	—$5,861	$1,204,335
Cumulative to date:		
1933	$1,338,758	1934	$1,010,476

Note: These figures include private bonds, and stocks sold for productive purposes; state and municipal bonds for construction; PWA loans and grants to states and municipalities, including the special highway funds; PWA private loans, and allotments for Federal construction.

INDEX NUMBER

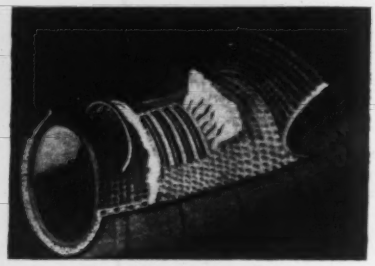
E.N.-R.- Cost	1913 = 100	1926 = 100	E.N.-R.- Volume	1913 = 100	1926 = 100
Dec., 1934	**201.86**	**97.03**	**Nov., 1934**	**115**	**50**
Nov., 1934	201.36	96.76	Oct., 1934	98	44
Dec., 1933	192.14	92.36	Nov., 1933	133	58
1933 (Av.)	170.18	81.80	1933 (Av.)	102	45
1932 (Av.)	156097	75.45	1932 (Av.)	127	56
1931 (Av.)	181.35	87.17	1931 (Av.)	220	96.5


CONTRACTS - WEEKLY AVERAGES
Current Week
Previous 4 Weeks
1934 to Date
1933, Av. for Year
0 5 10 15 20 25 30 35 40 45 50
Millions of Dollars
CUMULATIVE CAPITAL AND ENGINEERING CONSTRUCTION CONTRACTS AS REPORTED BY E.N.-R.
1934 capital
1934 contracts
1933 capital
1933 contracts
Millions of Dollars
0 125 250 375 500 625 750 875 1,000 1,125 1,250 1,375 1,500
PREVIOUS 4-WEEKS MOVING AVERAGE - CONSTRUCTION CONTRACTS AS REPORTED BY E.N.-R.
1934
1933
10 20 30 40
Jan. Feb Mar Apr. May June July Aug Sept Oct. Nov. Dec.

Construction Equipment and Materials

Suction Hose Reinforced With Cord and Wire

A new type of suction hose having a woven tubular reinforcement of cabled cotton cords and wire has recently been developed by the Electric Hose & Rubber Co., Wilmington, Del. The new hose has a smooth lining of specially compounded



Delmar reinforced suction hose

rubber having a long life and offering minimum frictional resistance to flow. The manufacturer states that the hose can be restored to shape should it be accidentally crushed by the use of a vise or mallet.

The new hose, known as Delmar suction hose, is made in all sizes up to 4 in. inside diameter.

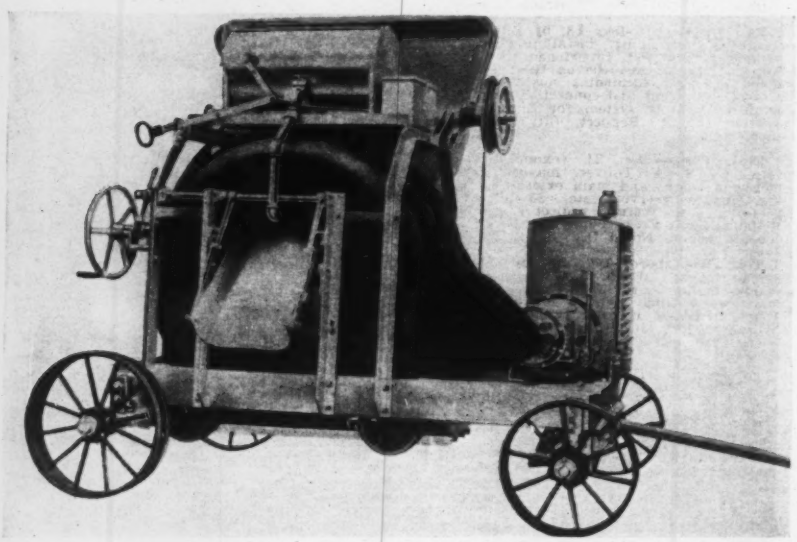
Concrete Mixer with Short Drum Allows Quick Handling

A new line of concrete mixers for which are claimed thorough mixing and rapid handling of dry materials and mixed concrete has been introduced by the Knickerbocker Co., Jackson, Mich.

The drum of the mixer is of large diameter and the distance from opening to opening is comparatively short. This shape keeps the aggregate together and permits larger openings for charging and discharging. The loading skip rises to an angle of 60 deg., a feature which the maker claims facilitates rapid charging and eliminates skip pounding and shaking. The discharge chute in discharge position assumes a 40 deg. angle.

The manufacturer states that the unusual speed of charging and discharging cuts down the time of the total operating cycle while allowing ample time for the mixing.

Concrete mixer has mixing drum of large diameter and short length



New Equipment in Brief

Gasoline Engine. The Hercules Motors Corp., Canton, Ohio, has added a larger bore model to their JX series of six cylinder gasoline engines. This new model, designated the JXD, is 4x4¼ in., with a 320 cu.in. displacement. The engine develops 83.8 hp. at 2,800 r.p.m. and 65.5 hp. at 1,800 r.p.m., with a maximum torque of 204 ft.-lb. at 1,000 r.p.m.

Welding Machine. A new close-coupled gas-engine-driven "Shield-Arc" welder of 300 ampere, 40 volt capacity, is announced by the Lincoln Electric Co., Cleveland, Ohio. Due to the close-coupling feature, the manufacturer states, the new unit is much more compact and of lighter weight than previous models. The generator is mounted on the engine housing.

Telemeter. A new telemetering device, termed the Metameter, has been introduced by the Bristol Co., Waterbury, Conn. It consists of a transmitter at the location where the temperature or pressure is being measured, an electrical circuit for conveying the impulses sent out by the transmitter, and a receiving instrument at headquarters for mechanically translating the impulses received into the measurements made. The duration of the transmitted impulse is proportional to the values measured. A two wire circuit is employed. The maker states that the equipment is self-checking and self-resetting and is applicable to remote control.

Dragline. Low ground pressure is the outstanding feature of the new P&H model 750-LC dragline, introduced by the Harnischfeger Corp., Milwaukee, Wis. It has been designed primarily for work on irrigation and drainage jobs where soft ground is encountered. The length of the crawler has been increased to 15 ft. 9¼ in. Crawler shoes are 42 in. wide, resulting in a reduction of ground pressure to 7.3 lb. per sq.in.

Wall Board. A new wall surfacing material termed Flexboard has been introduced by the Johns-Manville Co., New York, N. Y. The board is made of asbestos and portland cement. The maker states that it is flexible enough to be applied to curved surfaces and can be sawed and nailed like wood. There are two styles of the new material: decorative Flexboard to provide a colored, sanitary wall finish, and standard Flexboard.

Dump Trucks. The Hug Co., Highland, Ill., have just announced the addition of a new series of motor trucks, including two dump truck models. The new models consist of the 15 and 19 series. Each series has three standard models designated as A, D and T. The "A" is a straight commercial truck, the "D" a dump truck, and the "T" a tractor model. The model 15-D is rated as a 1½ to 2½ ton truck with a gross rating of 11,500 lb. The model 19-D is rated as a 2½ to 3 ton truck with a gross rating of 14,500 lb. This model is available in 2 and 3 yd. body capacities and comes equipped with a 5-speed forward, 2-speed reverse transmission.

New Publications

THE APPLICATION OF MONEL METAL AND NICKEL, International Nickel Co., New York, N. Y. 4x6½, 36 pages.

HOMES FOR MODERN LIVING, the Tran-Steel Corp., Detroit, Mich. 8½x11, 32 pages.

THE SHIELDED ARC, Lincoln Electric Co., Cleveland, Ohio. 8½x11, 12 pages.

MASONRY MORTAR, National Lime Association, Washington, D. C., 6x9, 36 pages.

THE AUSTIN ROLL-A-PLANE, Austin Western Road Machinery Co., Aurora, Ill. 8½x11, 8 pages.

WORTHINGTON-GAMON DISK WATER METERS, Worthington-Gamon Meter Co., Newark, N. J., four booklets, 8½x11, 8 pages each.

CEMENT BOUND MACADAM, Portland Cement Association, Chicago, Ill. 7½x10, 24 pages.

THE AIRCO-CB TRACTOGRAPH, Air Reduction Sales Co., New York, N. Y. 8½x11, 12 pages.

TECO TIMBER JOINT CONNECTORS, Timber Engineering Co., Washington, D. C. 6x9, 16 pages.

PRESSURE REGULATORS AND REGULATION PROBLEMS, Air Reduction Sales Co., New York, N. Y. 8½x11, 16 pages.

WOLMAN SALTS, American Lumber & Treating Corp., Chicago, Ill., 8½x11, 48 pages.

POTTSCO LIGHT WEIGHT AGGREGATES, the Pottsco Corp., Chicago, Ill. 8½x11, 44 pages.

NON-CLOGGING CENTRIFUGAL PUMPS, Economy Pumping Machinery Co., Chicago, Ill. 8½x11, 8 pages.

SHAFER ROLLER BEARINGS, Chicago, Ill. 8½x11, 50 pages.

EARTH MOVING AND MATERIAL HANDLING, the Browning Crane & Shovel Co., Cleveland, Ohio. 8½x11, 20 pages.

INLAND STEEL SHEET PILING, Inland Steel Co., Chicago, Ill. 8½x11, 12 pages.

MSA COMFO RESPIRATOR, Mine Safety Appliance Co., Pittsburgh, Pa. 8½x11, 4 pages.

CONSTRUCTION REPORTS

WATERWORKS

PROPOSED WORK

Ala., Stevenson—City plans purchasing automatic pump for 200 ft. well, new pipe line to be placed. $20,000. J. B. McCrary Co., 101 Marietta Bldg., Atlanta, Ga., engrs.

California—Mayors of cities of Carmel, Pacific Grove and Monterey authorized to engage consulting engineer to make surveys for municipal water system. Supervs. Monterey Co. will call special election to form district to finance same.

Calif., El Monte—J. C. Ells, engr., City Hall, preparing plans and specifications for 2,000 ft. 6 in. or 8 in. c.i. pipe to replace existing steel water pipe in Tyler St., for City.

Calif., San Rafael—Marin Municipal Water Dist., J. Burt, genl. mgr., to have plans made for 750 ft. 24 in. pipe line from Ross Reservoir to connect with trunk line at Ross; 7,000 ft. 8 in. pipe line from Homestead Valley pumping station to supply line for city in southern part of County; 2,225 ft. 8 in. pipe line in Kentfield.

Conn., Norwalk—Water Dpt., 78 Wall St., made plans watermains in various sections, incl. laying c.i. pipe and appurtenances. N. S. Hill, Jr., 112 East 19th St., New York, N. Y., engr.

Kan., Fredonia—City, election Dec. 24, $80,000, waterworks system, pipe line, lake or reservoir construction, etc.

Mass., Newton—City, Water Dpt., City Hall, plans addition to water reservoir at Waban Hill. W. P. Morse, city engr.

Mont., Hot Springs — Municipality plans waterworks. $41,000. T. A. Tashereau, Kalispell, engr.

N. J., Brielle—Boro plans waterworks, $40,000. G. Rowland Moore, Manasquan, engr. Noted Nov. 2.

N. J., Camden—City plans waterworks, $124,000. T. J. Daley, 1471 Baird Ave., city engr.

N. J., Spring Lake and Sea Girt—Boros Spring Lake and Sea Girt, plan waterworks, $36,000. G. R. Moore, Asbury Park, engr.

O., Bellevue—City retained G. B. Gascoigne, Leader Bldg., Cleveland, to make preliminary studies for waterworks improvement.

O., Cincinnati—City making plans pumping station building to house new electric pumps at Western Hills Station. $55,000. A. S. Hibbs, supt. waterworks. J. G. Steinkamp & Bro., Mercantile Library Bldg., archts.

O., Cincinnati—City making plans furnishing, installing electric pumps at Western Hills Pumping Station. $75,000. Fosdick & Hilmer, Union Trust Bldg., engrs.

O., Cincinnati—City making plans constructing roof over water basin at plant, near California St. Est. $175,000. Burns & McDonnell, Dixie Terminal Bldg., and 417 East 13th St., Kansas City, Mo., engrs.

O., Clyde—Village plans new 240,000 gal. reservoir. $20,000. Village Council has asked the common plans court to transfer $16,000 from the $56,000 surplus in municipal light fund to water fund for this purpose. Expect to rush project if transfer is O.K. Noted Nov. 29.

O., Columbiana—G. T. Hart, mayor, waterworks. $14,000. P.W.A. loan and grant rescinded. Project may go ahead under FERA. G. A. Reese, 360 Clark Bldg., Canton, engr.

O., Holland—Village, C. G. Price, mayor, defeated $31,000 bonds for waterworks system. Project may go forward under FERA. Geo. Champe & Associates, 1025 Nicholas Bldg., Toledo, engrs. Noted Nov. 15.

O., Marietta—C. P. Hoover, sanitary and water engr., 8 East Long St., Columbus, made preliminary survey of Marietta for filtration plant. $120,000. J. Morton Harper, mayor backing project.

O., Springfield—City plans water softening, filtration and purification works, 8,000 ft. 42- to 48-in. conduit, impounding reservoir. $1,462,000. Approved by P.W.A. Waterworks Dpt., Springfield, engrs.

Okla., Apache—City plans watermain extensions. $17,000. P.W.A. loan and grant approved. P. S. Donnell, Oklahoma City, engr. Noted Mar. 29.

Tenn., Baxter—City, survey and plans being made for complete water system, using water from spring with 100,000 gal. tank on 100 ft. tower. $40,000. J. A. Switzer, University of Tennessee, engr. P.W.A. project, but has not yet received P.W.A. approval. P.W.A. will be asked to approve after Congress convenes in January, next.

Tex., Denton—City making plans waterworks improvements, incl. new well and pipe lines. $25,000. W. N. Harris, Denton, engr.

Tex., Streetman—City, c/o R. C. Cole, mayor, voted $36,000 bonds and soon takes bids waterworks system, incl. deepening small lakes serving as water supply, 50,000 gal. elevated steel tank, pressure filters, pump station, 2- to 8-in. c.i. distributing lines. H. R. F. Helland, Frost Bldg., San Antonio, engr. P.W.A. project. Noted Nov. 8.

Tex., Three Rivers—City, c/o H. Coquat, mayor, made formal request to P.W.A. Board to permit city to construct waterworks improvements with day labor. $26,000. P.W.A. project. A. A. Ririe, 655 East Woodlawn St., San Antonio, engr. Noted Nov. 29.

Utah, Ogden—City soon takes bids 35-48 in. steel pipe supply line in Ogden Canyon, 38 m.g. concrete reservoir, metering entire city, repairing and replacing distribution system. $746,000. P.W.A. project. C. Corey, city engr. Noted Oct. 27, 1932.

Utah, Panquitch—City voted bonds replacing supply line and repairing and extending distribution system. $42,000. P.W.A. project. J. H. Clark, Panquitch, engr. Noted July 19.

Utah, Richfield — City defeated $116,000 bonds, rehabilitating water system. P.W.A. project. E. V. Christensen, Richfield, engr. Noted Aug. 30.

Ont., Toronto—North York Twp. plans pipe line from pumping station to new well. $25,000. It is probable that work will be done by relief labor and bids called for pipe. H. H. Baker, Town Hall, Willowdale, engr.

BIDS ASKED

Ill., Altamont—Dec. 18, by City, constructing waterworks. $37,500. P.W.A. project. W. A. Fuller, 2916 Shenandoah Ave., St. Louis, Mo., engrs. Noted Aug. 23.

Ill., Steele—Dec. 22, by Village, constructing waterworks. $40,000. P.W.A. project. J. G. Cooney, 3303 Rowland Ave., Belleville, engr.

Ind., Batesville—See "Contracts Awarded."

Ky., Arlington—City bids about Jan. 5 or 10, waterworks system, incl. well, pump, pump house, chlorinator, tank on tower, distribution mains, fire hydrants, valves and boxes, etc. P.W.A. allotted $38,000. J. S. Watkins, 610 Citizens Bank Bldg., Lexington, engr.

O., Wooster—Dec. 27, by City, iron removal and water softening plant. Barstow & Le Feber, 31 North Summit St., Akron, engrs. Noted Oct. 11.

O., Quaker City—Dec. 15, by Village, waterworks, incl. 4 wells, pumps and well houses, 14,580 ft. 2- to 8-in. c.i. pipe, valves, hydrants, meters, services, 100,000 gal. rein.-con. reservoir. Burgess & Niple, 568 East Broad St., Columbus, engrs.

Okla., Lawton—See "Contracts Awarded."

Pa., Pittsburgh—Dec. 18, by Dr. J. P. Kerr, controller, furnishing, installing motor driven pumping units and appurtenances at Lincoln, Saline, Highland and Herron Hill Pumping Stations, $44,000; furnishing, installing electrical control equipment and connections for 2 motors complete lighting system for Lincoln Pumping Station. C. M. Reppert, City County Bldg., engr.

Tex., Pecos—Dec. 21 (extended date), by City, c/o B. A. Toliver, mayor, waterworks, incl. new mains and main extension, new wells and surface reservoir, etc. $300,000. P.W.A. project. B. G. Warner, project engr. H. R. F. Helland, 1020 Frost Bank Bldg., San Antonio, consult. engrs. Noted Dec. 6.

Tex., Woodsboro—Dec. 28, by City, c/o E. Fricke, mayor, 20,800 ft. 4- to 8-in. c.i. watermains, 6,500 lin.ft. 2 in. and smaller galvanized water pipe, eight 8 in., six 6 in., four 4 in., fifteen 2 in. and twenty-one 5 in. fire hydrants, 125 house services, meters, meter boxes, tapping machine, pressure gage 6 in. master water meter, 75,000 gal. elevated steel tank and tower, water well and pumps, pumping station; 23,500 ft. 6- to 10-in. sewers, 31 manholes, 6 in. concrete bottoms, 8 in. brick walls and c.i. covers, 18 lamp holes, sewage disposal plant complete. $62,000. P.W.A. project. M. C. St. John, 1406 Esperson Bldg., Houston, engr.

CONTRACTS AWARDED

Calif., Los Angeles—Bd. Directors Metropolitan Water Dist., 306 West 3rd St., F. E. Weymouth, engr., constructing aqueduct, cut and cover siphons, outlet channel and appurtenant works on Colorado River Aqueduct. Spec. 82, Schedules 20K, 21, 22 and 23, to Griffith Co., 502 Los Angeles Railway Bldg., $1,739,846. Est. $2,200,000. Bids Dec. 4, awarded Dec. 7. Noted Nov. 22.

Colo., Montrose—At office B. Lowther, consult. engr., 710 Colorado Bldg., Denver, constructing 2 m.g. rapid sand filter and filter house, for City, to Price & O'Neill, Montrose, $30,248. Est. $35,000. Bids Nov. 18. **P.W.A.** Noted Oct. 11.

Ill., Springfield—City, water treatment plant, to Alzina Constr. Co., Public Service Bldg., $363,608. Subject to approval of P.W.A. Bids Nov. 19. Noted Nov. 8.

Ind., Batesville—City, H. J. Johnson, clk., laying 2,800 ft. armco spiral pipe for watermains, day labor, separate contracts for materials. $5,620.

Kan., Argentine—Shawnee Twp., new water supply system, south of here, to J. J. Connor & Son Constr. Co., City Bank Bldg., Kansas City, Mo., $196,681. **P.W.A.** Noted Nov. 8.

Md., Frostburg—City, constructing dam, to G. Hazelwood, Cumberland, $82,794. **P.W.A.** Bids Nov. 7.

Mass., Lowell — City, c/o Superintendent Waterworks, City Hall, Contr. 1, constructing 1 m.g. steel standpipe at Lowell Highlands, 600,000 gal. standpipe at Belvidere Section and 400,000 gal. standpipe at Christian Hill Sect., to McClintic-Marshall Corp., 75 Federal St., Boston, $39,650; Contr. 2, constructing concrete founds. for same, to C. Reppucci & Co., 10 Garden Court St., Boston, $8,239. **P.W.A.** Bids Oct. 8. Noted Oct. 4.

Mass., Townsend—Town, Bd. Water Comrs., C. B. Willard, secy., furnishing, installing pumps and equipment in connection with waterworks, to F. A. Mazzur Co., Inc., 141 Milk St., Boston, $6,725. **P.W.A.** Bids Nov. 27, awarded Dec. 5. Noted Nov. 22.

N. J., Trenton—City Commissioner, constructing oil heaters and tanks, electrical thermal controls, pipes, for Trenton Water Dpt., to W. R. Thropp & Son, East State St., $3,949. Bids Nov. 30.

N. M., Magdalena—City, rehabilitating present water system, to P. McClenden, Albuquerque, $39,000. **P.W.A.** Bids Nov. 8. New Mexico Eng. Co., 208 Springer Bldg., Albuquerque, engrs. Noted Nov. 2, 1933.

N. M., Silver City—Town, constructing distribution system, to Hayner & Burns, Las Cruces, $25,474. **P.W.A.** Bids Nov. 17.

N. M., Taos—City Council, deep well, pumping plant, 200,000 gal. storage tank and 2- to 8-in. c.i. distribution system, 50,000 gal. steel tank and tower, to Layne Western Co., B.M.A. Bldg., Kansas City, Mo., approximately $70,000. **P.W.A.** Bids Nov. 19. Noted Nov. 15.

N. Y., New York—Bronx Waterworks Corp., general contractors, 1 Riverdale Ave., 700 tons 72 in. steel pipe for watermains in Central Park, etc., to Alco Products Co., 220 East 42nd

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†*Federal Government.*

For official proposal advertising see Searchlight Section

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Federal Government projects are classified under heading denoting type of work and designated by symbol of †

◆

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Waterworks (Continued)

St., New York, for Dpt. Water Supply, Gas & Electricity, Municipal Bldg. Noted Dec. 5, under "Contracts Awarded."

O., Athens — City Council, water softening plant, zeolite system, 3 filters, two to be equipped, to W. A. Wood Co., 2714 Union Guaranty Bldg., Detroit, Mich., $44,000; wells, pump house, pumps, piping and electrical work, distribution system, to H. E. Miller, Columbus, not to exceed $8,550. **P.W.A.**

O., Conneaut—See "Unclassified."

O., Oak Hill—Village, L. C. Davis, mayor, constructing Contr. 3, one 80,000 gal. and one 70,000 gal. elevated steel storage tanks, to Western Gas & Electric Co., Ft. Wayne, Ind., $4,710***Contr. 1, iron removal and pump works, to Kelso Wagner Co., 134 West 2nd St., Dayton, $28,894***Contr. 4, services and meters, also distribution system, incl. 35,565 ft. 2- to 12-in. c.i. pipe, 34,350 lb. special castings, to O. V. Arnett, Berea, Ky., $4,678 and $49,717 respectively. Grand total $87,999. **P.W.A.** H. K. Bell, Lexington, Ky., engr. Bids Oct. 31. Noted Oct. 25.

Okla., Checotah—City, impounding reservoir, dam, pipe line and improving filter plant, to Sheehan Pipe Line Co., Philtower Bldg., Tulsa, $49,831. Est. $60,000. **P.W.A.** Bids Nov. 26. Noted Nov. 15.

Okla., Lawton—City raising present 60 ft. masonry dam 5 ft. in height by FERA labor and local materials. W. H. Drover, engr., City Hall, advises that city does not contemplate 11,000 ft. 4 and 6 in. c.i. watermain extensions. (**Correction**—type of work involved.) Noted Nov. 29.

Okla., Lexington—City, watermain extensions, to Sherman Iron Wks., 18 East Main St., Oklahoma City, $14,000. Est. $15,000. **P.W.A.** Bids Nov. 27. Noted Aug. 2.

Tenn., Grand Junction—Town, at office of G. Mitchell, recdr., drilling two 75 g.p.m. wells and pumps, to Corliss Well Supply Co., Memphis, $6,916; pipe lines, etc., to Volz Constr. Co., Baltimore Bldg., Memphis, $27,589. **P.W.A.** Bids Nov. 24. Noted Nov. 1.

Tex., Del Rio—City, T. M. Johnson, mayor, general contract waterworks improvements, wells, elevated tank, and distributing lines, to Youmans Constr. Co., Kirby Bldg., approximately $63,000. Est. $77,000. **P.W.A. (Correction**—Name of contractor.) Noted Nov. 1.

Tex., Hughes Springs—City, c/o G. E. Goolsby, waterworks and sewerage system, to Sherman Machine & Iron Wks., 18 East Main St., Oklahoma City, Okla., $52,464. **P.W.A.** Bids Nov. 15. Noted Nov. 1.

Utah, Nephi—City, 18,200 lin.ft. 4 in. c.i. flow pipe, to Waterworks Equipment Co., 149 West 2nd St. S., Salt Lake City, $6,585. Est. $6,600. **P.W.A.** Bids Nov. 18. Funds granted by State Emergency Drouth Committee.

Wis., Marathon — Village, pumping station, reservoir, well house, tank foundation, piping, sewage disposal plant equipment, to Gray-Robinson Constr. Co., Manitowoc, $15,530*** pumps, to Allis-Chalmers Mfg. Co., 1126 South 70th St., Milwaukee, $2,527***steel storage tank, to Graver Tank & Mfg. Co., East Chicago, Ill., $2,533***12 in. well with 30 ft. screen, to C. Lang, Marathon, $1,900. Grand total $22,490. **P.W.A.** Bids Nov. 8.

Wyo., Medicine Bow—City, 8 mi. 6 in. c.i. pipe line from Como Wells to town, to J. S. Schwartz, Colorado Springs, Colo., $49,300. **P.W.A.** Bids Nov. 19. Noted Sept. 27.

SEWERAGE AND WASTE DISPOSAL

PROPOSED WORK

Calif., Escalon—Escalon Sanitary Dist. voted bonds to purchase materials for sewerage system, $12,500. Application will be made for SERA labor. Noted Aug. 2.

Ill., Nebo—City plans sewerage extension. A. J. Miller, Pittsfield, engr. Awaiting approval H. F. Ferguson, ch. sanitary engr. State Dpt. P. Health, Div. Sanitary Engineering.

Ill., Quincy—City plans sanitary sewer laterals. B. W. Bartlett, Quincy, engr. Awaiting approval H. F. Ferguson, ch. sanitary engr. State Dpt. Health, Div. Sanitary Engineering.

Ill., Rochelle—City making plans and takes bids early in 1935, constructing sewage treatment plant, activated sludge, mechanical aeration method. P.W.A. project, $71,000. Suhr, Berryman, Peterson & Suhr, 130 North Wells St., Chicago, engrs. Noted Aug. 9.

Ind., Gary—Sewer Dist. making plans constructing sanitary sewers in area bounded by 47th, 53rd, Mississippi and Harrison Sts. $103,433. J. Hayes, Gary, engr.

Ia., Oskaloosa—See "Contracts Awarded."

Kan., Hays—City plans completed, awaiting approval of P.W.A. for separate sludge bed digestion type sewage disposal plant, $65,000. E. T. Archer & Co., 609 New England Bldg., Kansas City, Mo., engrs. Noted Nov. 8.

Mass., Boston—Boston Elevated Railway Co., Engineering Dpt., 31 St. James Ave., plans stone dyke and filling along Fort Point Channel for 1,000 ft. upstream from Dover St. bridge and at owner's Albany St. Wharf. Awaiting Government approval. To exceed $25,000.

N. J., Audubon—City plans sewers, $35,000. M. N. Hannon, Jr., Century Theatre Bldg., engr.

N. J., Bradley Beach—Boro plans sewers, $54,000. Niart Rogers, 418 Monmouth Ave., engr.

N. J., Island Heights—Boro Council plans sewers. $66,000. Sherman & Sleeper, 601 Cooper St., Camden, engrs. Noted Nov. 22.

O., Dayton—City plans completed Lorain Ave. Storm Sewer, incl. 3,085 ft. 12- to 48-in. reinf. con. pipe. $40,000. P.W.A. project. W. Macey, engr. sewers.

Pa., Ambler—Boro plans 55,800 ft. sanitary sewers and laterals. $309,392. Now pending FERA grant. Albright & Friel, Inc., 246 South 15th St., Phila., consult. engrs. Noted Oct. 26.

Pa., Lewisburg—Borough plans 2,900 lin.ft. sewer along river front, $28,000. **Maturity soon.** W. Frick, Lewisburg, boro engr.

Tex., San Antonio—Bexar Co. Water Control & Impvt. Dist. 4, Harlandale, c/o P. H. Mullinax, 601 Pleasanton Rd., voted bonds for sanitary sewerage system, Harlandale, incl. 8 mi. collecting lines, small administration building, etc. Bids soon. Est. $154,000. P.W.A. project. $117,000 amount of bonds as loan to be repaid Government. H. R. F. Helland, Frost Bldg., engr. Noted Nov. 8.

Va., Cape Charles—City plans sewage disposal plant. $35,000. P.W.A. project.

Va., Richmond—City Council plans sewer projects and street improvements. $200,000.

Ont., Forest Hill—Village plans trunk sewer. Soon takes bids for part of work, est. $50,000. Total est. $200,000. H. McNicol, comr. of Wks., 33 Lonsdale Rd.

Ont., Kirkland Lake—Teck Twp., a tunnel or other means of disposing of sewage from septic tanks is under discussion at Parliament Buildings, Toronto, following a protest of township against present conditions. $90,000. H. Sutcliffe, New Liskeard, engr.

Ont., Long Branch—Town, having plans made by own engineer for sludge disposal plant.

Ont., Niagara Falls—Municipal Council plans sewers. $41,617. Work probably by day labor.

BIDS ASKED

Ind., Michigan City—Dec. 20, at office Bd. P. Wks., W. C. Haviland, chn., City Hall, sewage treatment works, incl. sewage treatment plant and intercepting sewers. P.W.A. project. C. H. Hurd, 1039-1041 Architects and Builders Bldg., Indianapolis, Ind., consult. engrs. Noted Oct. 4.

Ind., Princeton—Dec. 20, by Bd. P. Wks., City Hall, H. R. Hillman, chn., sewage treatment plant, intercepting sewer. P.W.A. project. Finch & Babcock, 276 Century Bldg., Indianapolis, engrs. Noted Nov. 29.

Ia., Dubuque—Jan. 7, by City Clerk, constructing 8 in. vitr. tile sewer in Cox St., from West 14th to Chestnut Sts. and in Chestnut St., 150 ft. from Cox St.; incl. 4 brick manholes, fifteen 8x4 Y branches. W. N. Cullen, city engr.

O., Cincinnati—Jan. 19, by Comrs. Hamilton Co., sanitary sewerage system, $190,000. P.W.A. project. J. S. Rafferty, county sanitary engr.

Pa., Franklin—See "Contracts Awarded."

Tex., Woodsboro—See "Waterworks."

CONTRACTS AWARDED

Ill., Monmouth—City, construction and equipment for activated sludge type sewage disposal plant incl. 4 in. plunger sludge pumps, 1 centrifugal sewer pump, 1 sump pump, to Priester Constr. Co., Davenport, Ia., $103,617; 72 in. trunk sewer with necessary manholes, to Krenn & Dato, 228 North LaSalle St., Chicago, $25,766. Est. $157,000. **P.W.A.** Bids Nov. 5. Noted Oct. 11.

Ia., Iowa City—City Council, trunk line sewers from Front and Prentis Sts. south along Iowa River, to Gjellefold Constr. Co., Forest City, $26,854***Rolston Creek Improvement, to W. Horrabin Constr. Co., Iowa City, $73,301 ***sewage treatment plant, incl. Amcre filter drains, to Barnett & Record Co., 700 Flour Exch. Bldg., Minneapolis, Minn., $274,570. Grand total $374,735. **P.W.A.** Bids Nov. 16. Noted Nov. 8.

Ia., Oskaloosa—City, constructing Divs. A and C, Northeast and Southwest Sewage Disposal plant, to McKey-Fansher Co., P. W. Sparks Contractor, Jones Constr. Co. and Carlon Constr. Co., Oskaloosa, $146,290. Following types of equipment were specified for various units: gates and hydrants, Iowa Valve Co., Oskaloosa; clarifier for primary settling tank, siphon and rotary distributor, sludge digester

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†*Federal Government.*

Sewerage, etc. (Continued)

equipment, plunger type sludge pump, Dorr Co., 221 North La Salle St., Chicago, Ill.; gas equipment and boiler, Bryan & Dorr; centrifugal sludge pump and sewage pumps, Yoeman Bros. Co., 1430 Dearborn St., Chicago, Ill.; deep well turbine pump, Fairbanks Morse Co., 900 South Wabash Ave., Chicago, Ill.; trickling filter underdrains, Rawn-Watcheer Clay Products, Watcheer. All bids on Divs. B, D and E outfall sewers rejected. City will purchase materials and carry on work under F.E.R.A. Bids Nov. 27. Noted Nov. 22.

†**Md., Annapolis**—Yards & Docks, Navy Dpt., Wash., D. C., altering and constructing sewerage system additions at Naval Academy, Spec. 7517, to Boudin Contg. Corp., 225 East 21st St., New York, N. Y., $95,540.

O., Asheville—F. J. Hines, clk. Bd. P. Affairs, 17,600 ft. 8- to 12-in. vitr. clay sewers in all streets, to C. J. Wetzel, 126 Otterbein Ave., Dayton, $32,775. P.W.A. Bids Nov. 9.

O., Cleveland—City, constructing four 50x50 ft. rein.-con. sludge digester tanks, 50 ft. deep, 45,000 cu.ft. capacity at Westerly Sewage Treatment Plant, to Hunkin-Conkey Constr. Co., 1740 East 12th St., $138,545. P.W.A. Awarded Nov. 5.

O., Hicksville—Village Council, sewage disposal plant, trickling filter tanks, sludge beds, 2nd settling tanks, etc., to Buesching Bros. Constr. Co., 1426 St. Joe St., Fort Wayne, Ind., $57,008. P.W.A. Bids Sept. 21.

O., Sebring—City, rebuilding and modernizing sewage disposal plant. Work to be done with FERA labor. Est. $23,000. L. Fawcett, Youngstown, engr. Noted Nov. 22.

O., Van Wert—B. A. Welch, dir. P. Wks., Contr. 2, 2 sewer pumps for sewage treatment plant, to Buesching & Hageman Corp., 402 East Superior St., Fort Wayne, Ind., $14,188. P.W.A. Bids Aug. 29.

Pa., Franklin—Sugarcreek Twp., Venango Co., H. B. Sigworth, clk., 2 intercepting sewers, 1 along 13th St., Franklin, and other from Eclipse Refinery to junction of French Creek and River, day labor, under supervision of J. McK. Snow, City Hall, twp. engr. $58,700. Noted Nov. 22.

Pa., Meyersdale—Borough, flood control project of Flaugherty Creek, $18,650, and also improving streets in boro, $6,035, by day labor under supervision of Borough Eng. Dpt. LWD projects approved.

Wis., Mendota — State constructing pressure sewer, pumping station, at State Hospital and reconstructing sewage plant, to J. M. Walsh, Madison, $36,174. P.W.A. Bids Nov. 13. Noted Nov. 8.

Que., Westmount — City Council, sewer in Western Ave., to Atlas Constr. Co. Ltd., Montreal, $69,910.

BRIDGES AND GRADE CROSSINGS

PROPOSED WORK

Calif., Burlingame—Municipality and Southern Pacific R.R., W. H. Kirkbride, ch. engr., 65 Market St., San Francisco, plans grade separation over railroad at Bway. $175,000. **Maturity later.**

Calif., Redding—State Hy. Dpt., Sacramento, plans rein.-con. overhead crossing over tracks of Southern Pacific R.R., here, replacing timber trestle on Trinity River lateral of State Hy. system. C. H. Purcell, Sacramento, state hy. engr.

Conn., Bridgeport—City, P. Wks. Dpt., plans application for $120,000 P.W.A. grant and $36,000 loan to repair Stratford Ave. Bridge, raising capacity from 15,000 to 20,000 tons; also restoring Grand St. bridge now out of use. F. Toquet, City Hall, engr.

Conn., Bridgeport—City, P. Wks. Dpt. plans replacing and repairing at various bridge, New Island Brook bridge, materials $8,585 and labor $14,425; repairing Hollister Ave. bridge, materials $400, labor $600; redecking Yellow Mill Bridge, $25,000. State Aid $27,000 also available. F. Toquet, City Hall, Bridgeport, engr. Noted Aug. 30.

Ky., Fort Thomas—Cincinnati, Newport & Covington Ry. Co., Covington, plans bridge alterations, repairs and track work. $40,000. **Maturity in 1935.**

Ky., Newport—Cincinnati, Newport & Covington Ry. Co., 3rd and Court Sts., Covington, plans viaduct improvements, track work, etc., Monmouth St. Viaduct. Est. $104,000.

La., Slidell—State Hy. Comn., Baton Rouge, making surveys to locate 1,000 ft. concrete bridge, 500 ft. earth approaches on each side, 21 ft. clearance over tracks of Southern Ry. on Old Spanish Trail, near here.

Mich., Bay City—City making plans bridge over East Channel of Saginaw River, trestle approach with 80 ft. pontoon swing span. $30,000. City Engineer, engr.

†*Federal Government.*

Tenn., Knoxville—City, City Manager, City Hall Park, making plans 650 ft. rein.-con. bridge, H. H. Hale, City Hall Park, city engr. $150,000. Southern Railway, in Chief Engineers Office, McPherson Sq., Wash., D. C., preparing plans for same.

N. S., Springhill—Ministry of Hys., Halifax, preparing plans for bridge over C.N. RR., tracks. $93,000.

Ont., Toronto—City preparing plans bridge over Canadian Natl. Railway right-of-way, on Patricia Dr. Est. $125,100. When plans are completed same will be presented to Ontario Ry. Bd. for approval. Railway and Bridge Dpt., City Hall, engrs.

Que., Ascot—I. E. Vallee, Dpt. Roads, Quebec City, preparing plans steel bridge between here and Sherbrooke.

BIDS ASKED

Alabama—See "Streets and Roads."

Arkansas—Dec. 18, by State Hy. Comn., Little Rock, repairing, remodeling and painting 2 structural steel bridges, one 391 ft. long and other 40 ft. long on Twist Ferry, Marle Rd., Job 11074, Crittenden Co. W. W. Zass, Little Rock, engr.

Georgia—Dec. 21, by State Hy. Bd., Atlanta, bridge over Potato Creek, N.R.S. 539, Thomaston-Greenville Rd., Upson Co.; bridge over Georgia & Florida R.R., N.R.S. 484, Richmond Co.; bridge over Chattahochee River, N.R.H. 535-C, Atlanta-Marietta Rd., Fulton and Cobb Counties; 3 bridges at Mosey Creek, Mule Creek and Cape R.R., N.R.H. 538-A, Ft. Valley-Macon Rd., Peach Co.; bridge and approaches at City Canal on Broad St., Augusta, Augusta-McCormick Rd., N.R.M. 537-A, Richmond Co.; bridge over Southern R.R. on Montezuma-Hawkinsville Rd., N.R.H. 499-C, Houston Co.; bridge over Peachtree Creek, N.R.S. 534-A, De Kalb Co.; bridge over Reeds Creek, N.R.S. 506-B, Lincolnton-Augusta Rd., Columbia Co.; 2 bridges, Hurricane and Ten Mile Creek, N.R.S. 513-B, Alma-Patterson Rd., Bacon Co.; 3 bridges over S. A. L. R.R. Big Powder Creek, Little Powder Creek, N.R.H. 30-B, Cobb Co.; 2 bridges, 1 over Ocmulgee River and other Yellow Water Creek, N.R.H. 58-A, Jackson-Monticello Rd., Butts and Jasper Counties; 1 bridge over Oconee River, N.R.S. 228-A, Greensboro-Watkinsville Rd., Greene Co.; 1 bridge, N.R.H. 535-B, Atlanta-Marietta Rd., Fulton Co.; bridge N.R.S. 526, Sycamore-Ocilla Rd., Turner Co.; bridge N.R.S. 517-B, Greenville-Zebulon Rd., Meriwether Co.; bridge N.R.M. 403-D, Tipton-Waycross Rd., Tift Co.

Indiana—Dec. 18, by State Hy. Comn., Indianapolis, rein.-con. girder bridge over Chicago, Michigan, St. Paul and Pacific R.R., Bridge Contr. 986, NRHM 92-A 37-G-603; rein.-con. arch bridge over Salt Creek, Bridge Contr. 987, NRHM 92-A 37-G-137, both Seymour Dist., Lawrence Co.; rein.-con. arch bridge over Wabash River, near Delphi, Bridge Contr. 1005, NRH 351-C 39-K-1603; rein.-con. bridge over Wabash & Erie Canal, NRH 351-C 39-K-1602, Birdge Contr. 1006; and bridge over Wabash Over Flow, 39-K-1764, all foregoing Laporte Dist., Carroll Co.; bridge over White River, near Winchester, Bridge Contr. 1008, 27-F-1796, Greenfield Dist., Randolph Co.

Iowa—Dec. 18, by State Hy. Comn., Ames, constructing bridge on Primary R.I. 101, north of corporation line of Vinton, NRH-NRM 58 DE, Benton Co. P.W.A. project. F. R. White, ch. engr.

Kentucky — Jan. 4, by State Hy. Comn., Frankfort, five 40 ft. rein.-con. deck spans and approaches for bridge over Bullskin Creek, on Finchville-Shelbyville Rd., State Project 46 CB, Shelby Co.

Massachusetts—Dec. 18, by Commonwealth of Massachusetts, Dpt. P. Wks., 100 Nashua St., Boston, 1 span, steel plate girder railroad bridge and 6,932 ft. 30 ft. wide rein.-con. hy., Holyoke. P.W.A. project. F. E. Lyman, comr. A. W. Dean, ch. engr.

Massachusetts—Dec. 20, by Commonwealth of Massachusetts, Metropolitan Dist. Comn., 20 Somerset St., Boston, D. B. Keniston, comr., constructing trunnion type steel draw span of Wellington Bridge over Mystic River between Somerville and Medford. To exceed $25,000. P.W.A. project. Noted Apr. 26, under "Contracts Awarded."

Missouri—Dec. 20, by State Hy. Dpt., Jefferson City, bridges over Middle Fork of Lost Creek, Route SA, NRS 547, Fairport-Maysville Rd., DeKalb Co.; over branch Thompson Fork, Route SA, NRS 537, Chillicothe-Northwest Rd., and over stream on same road, both Livingston Co.; over Long Branch, Route SJ, NRS 541 Atlanta-Elmer Rd., over Middle Fork Chariton River, Route SJ, NRS 541 same road, both Macon Co.; under C and A Railroad, Route 54, NRH 126A, east of Mexico, Audrain Co.; over Little Lead Creek, Route SE, NRS 531, Silex-Olney Rd., Lincoln Co.; over North Fork of Middle Fabian River, Route ST NRS 519, Bible Grove-Route 51 Rd., Scotland Co.; over Fishing River on Route SE, NRS 540, Orrick-Camden Rd., Ray Co.; over Smith Branch, PWA 76, SH Refund 1, Montgomery City-Danville Rd., Montgomery Co.; over St. Louis, San Francisco R.R. Route 30 NRH 351E, St. Clair, East,

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Bridges (Continued)

Franklin Co.; over Coles Branch, Route SK, NRS 517, Liberal East, Barton Co.; over branch Route SC-NRS 516B, Route 57-Route B Rd., Jasper Co.; over little Sac River, Route SJ, NRS 399D, Aldrich-Eldora Rd., Polk Co.; over Coday Branch, Route SJ, NRS 502A, Duncan-Hartville Rd.; over Dry Wash, Route SJ, NRS 502A, Duncan-Hartville Rd.; over Dry Wash, same road, all foregoing Wright Co.; over Wabash R.R., Route 61 NRH 471A, Page Ave. Viaduct, St. Louis Co.; over River Des Peres, on same road; over Jones Creek, Route SJ, NRS 530, Diamond-Wentworth Rd., Newton Co. T. H. Cutler, ch. engr.

New Jersey—Dec. 27, by State Hy. Comn., Trenton, constructing bridge to carry Route 23, Sect. 12C, over Pompton River, Passaic and Morris Counties, incl. 9,230 cu.yd. channel and 2,370 cu.yd. foundation excav. A. L. Grover, ch. clk.

N. J., Pompton Lakes—Dec. 17, by Erie R.R. Co., G. S. Fanning, ch. engr., Midland Bldg., Cleveland, O., eliminating grade crossing, incl. 250 tons structural steel.

†**N. C., Fairfield**—Dec. 28, by U. S. Eng., Norfolk, Va., constructing highway bridge across Inland Waterway, near here.

Ohio—Dec. 22, by O. W. Merrell, dir. Hys., Columbus, two 46 ft. and one 57.5 ft. span creosoted timber bridge with continuous steel beams over Indian Lake, north of Bellefontaine, on Sect. "B" Indian Lake Island Rd., Logan Co., $12,672; two 40 ft. and one 50 ft. span concrete bridge having steel beams over Caesar's Creek, south of Xenia, and grading, hot mixed asphaltic surfacing 0.148 mi. approaches, on Sect. "B" and "I" Wilmington-Xenia Rd., Green Co., $33,267. P.W.A. project.

Oregon—Dec. 20, by State Hy. Comn., Portland, constructing 900 ft. pile trestle over Tualatin River; 35 ft. rein.-con. deck pile trestle over Deer Creek, Nehalam Hy., both Washington Co. R. H. Baldock, Salem, state hy. engr.

Wash., Port Angeles—Dec. 27, by Clallam Co., 220 ft. steel bridge with concrete piers and pile trestle, approaches over Sol Duc River. Bids Dec. 3 rejected.

West Virginia—See "Streets and Roads."

CONTRACTS AWARDED

California — State Hy. Comn., Sacramento, steel, concrete superstructure and portions of abutments of bridge over Tisdale Weir on Knights Landing and Meridian, Sutter Co., to P. F. Bender, 1012 Del Paso Blvd., Sacramento, $27,023. Bids Nov. 21, awarded Nov. 27. Noted Nov. 15.

Calif., San Francisco—California Toll Bridge Authority, 500 Sansome St., final field painting of all steel superstructure, incl. cables and attachments of West and East Bay crossings of San Francisco-Oakland Bay Bridge, to Bridge Builders, Inc., Outer Harbor, Oakland, $835,000. Awarded Nov. 27.

Indiana — State Hy. Comn., Indianapolis, bridge in Morgan Co., to Foulkes Constr. Co., 7054 Ohio St., Terre Haute, $4,536 est. $5,733 ***2 bridges in Newton Co., to R. H. King, Danville, $12,483 est. $15,042. Bids Nov. 20. Noted Nov. 15.

Louisiana—State Hy. Comn., Baton Rouge, overpass and approaches on 0.387 mi. Project 480B, NRH 169-D, between Livonia and Krotz Springs, Pointe Coupee Parish, to Pittsburgh-Des Moines Steel Co., 1015 Tuttle St., Des Moines, Ia., $165,991. **P.W.A.** Bids Nov. 21. Noted Nov. 8.

La., New Orleans—See "Unclassified."

Maine—State Hy. Comn., Augusta, 1 span bridge, concrete abutments on wood pile and timber grillage, concrete deck, as per Proposal "B" 3,000 lin. ft. wood piles, 40,000 ft. B.M. timber, 625 cu. yd. rein.-con. over west branch of Cathance Stream, Bowdoinham Co., to E. C. Snodgrass, Augusta, $26,935. Bids Nov. 7, awarded Dec. 3.

Oklahoma—State Hy. Dpt., Oklahoma City, 9 span 1,450 ft. bridge in Pawnee Co., to List & Weatherly, Railway Exch. Bldg., Kansas City, Mo., $170,201 est. $183,000***3 span 66 ft. bridge in Latimer Co., to Lee Poole, Fairview, $5,547 est. $6,000***82 span 2,460 ft. bridge in Harper Co., to R. R. Taney, 710 East 19th St., Oklahoma City, $112,876 est. $125,000. Grand total $288,624. **P.W.A.** Bids Dec. 4.

Texas—G. Gilchrist, state hy. engr., Austin, constructing 3 rein.-con. bridges on Hy. 5, NRH 438-C, Donley Co., to O. Speer, Alford, $20,220 est. $20,000; bridge over Double Mountain Fork Brazos River, Hy. 4, NRS 783-F, Stonewall Co., to Holland Page Co., Norwood Bldg., Austin, $48,497 est. $40,000. **P.W.A.** Bids Nov. 26. Noted Nov. 29.

Texas—G. Gilchrist, state hy. engr., Austin, constructing Elm Creek Bridge, on Hy. 115, S.P. 1085-D, Menard Co., to W. R. West, Fort Worth, $29,020 est. $40,000; 2 bridges on Hy. 2, S.P. 28-C, Hays Co., to D. H. Buchanan Constr. Co., San Antonio, $26,706 est. $20,000. Bids Nov. 26.

Wisconsin—State Hy. Comn., Milwaukee, 2 bridges in Trempealeau Co., to M. E. Souther, Inc., 1528 Branston St., St. Paul, Minn., $12,548***3 bridges in Trempealeau Co., to J. Germann, LaCrosse, $6,904***5 structures in Trempealeau Co., to A. R. Coffeen, Decorah, Ia., $12,999***2 bridges, Buffalo Co., to M. Waukee Bridge Co., 3282 North 34th St., Milwaukee, $51,109***bridge in Shawano Co., to R. J. Eckenrode, 515 70th St., Kenosha, $28,397. Grand total $111,957. **P.W.A.** Bids Nov. 27. Noted Nov. 15.

STREETS AND ROADS

BIDS ASKED

Alabama—Dec. 22, by State Hy. Dpt., Montgomery, rein.-con. paving 0.387 mi. NRH 56, NRM 56, in North Birmingham; concrete bridge on Huffman-Mt. Pinson Rd.; overhead bridge on NRH and M 56, 3,100 cu.yd. class A concrete, 78,000 lb. reinforcing steel. P.W.A. project.

Arizona—Dec. 27, by State Hy. Comn., Phoenix, widening, cutback asphalt plant mix on existing asphalt paving 1.2 mi. Tucson-Nogales Hy., NRH 29, A.F.E. 8930. T. S. O'Connell, state hy. engr.

Arizona—Dec. 27, by State Hy. Comn., Phoenix, furnishing, hauling and placing base course 23.6 mi. Ashfork-Kingman Hy., NRH 80-G, AFE 6626. T. S. O'Connell, state hy. engr.

Arkansas—Dec. 18, by State Hy. Comn., Little Rock, grading, drainage structures, gravel base course paving 7.6 mi. Bearden-Thornton Rd., Hy. 167, Sects. 4 and 5, Job 7121, Ouachita and Calhoun Counties; concrete paving 9 mi. Grady-Gould-Cottondale Connection, Hy. 65, Sects. 15 and 16, Job 2164, Lincoln and Jefferson Counties. W. W. Zass, State Hy. Comn. engr.

Georgia—Dec. 21, by State Hy. Bd., Atlanta, paving 0.485 mi. Tifton-Waycross Rd., N.R.M. 403-D, Tift Co., involving 71,189 cu.yd. earth excav.; 2.489 mi. Pembroke-Savannah Rd., N.R.H. 428-B, Bryan Co., 31,521 cu.yd. earth excav.; 5.836 mi. Baxley-Jesup Rd., N.R.M. 256-A-B, Appling Co, 3,495 cu.yd. earth excav., 3.988 mi. Hawkinsville-Abbeville Rd., N.R.H. 299-C and 113, Pulaski Co., 3,620 cu.yd. earth excav.; 0.516 mi. Pearson-Waycross Rd., N.R.M. 337-B, Ware Co., 1,360 cu.yd. earth excav.; 2.173 mi. Winder-Gainesville Rd., N.R.S. 529-B, Jackson Co., 11,644 cu.yd. earth and 610 cu.yd. rock excav.; 3.928 mi. Abbeville-Hawkinsville Rd., N.R.H. 299-D, Wilcox Co., 3,524 cu.yd. earth excav.; 5.159 mi. Atlanta-Buford Rd., N.R.S. 496-B, Gwinnett Co., 4,076 cu.yd. earth excav.; 6.333 mi. Talbotton-Geneva Rd., N.R.M. and H 386, Talbot Co., 6,503 cu.yd. earth excav.; 5.238 mi. Gray-Monticello Rd., N.R.H. and M 443-C, Jasper Co., 31,647 cu.yd. earth and 372 cu.yd. rock excav.; 0.723 mi. Cordele-Abbeville Rd., N.R.M. 511-B, Crisp Co., 1,604 cu.yd. earth excav.; 7.977 mi. McRae-Alamo Rd., N.R.H. 412-A and E and N.R.M. 412-E, Wheeler Co., 3,907 cu.yd. earth excav.; 3.517 mi. Macon-Dublin Rd., N.R.H. 342 Part 2 and N.R.M. 342, Twiggs Co., 35,805 cu.yd. earth excav.; grading, 1 underpass on 0.3 mi. Fairmount-Chattsworth Rd., N.R.H. 190-B, Murray Co., 13,711 cu.yd. earth and 928 cu.yd. grading, 2 culvert type bridges 4.753 mi. Atlanta-Marietta Rd., N.R.H. 535-D, Cobb Co., 248,758 cu.yd. earth excav.; grading 3.806 mi. Atlanta-Marietta Rd., N.R.H. 535-B, Fulton Co., 201,148 cu.yd. earth excav.; 4.228 mi. N.R.S. 526, Sycamore-Ocilla Rd., Turner Co., 44,827 cu.yd. earth excav.; 0.707 mi. Greenville-Zebulon Rd., N.R.S. 517-B, Meriwether Co., 33,830 cu.yd. earth excav.

Ill., Mount Vernon—Dec. 18, by Dpt. P. Wks. & Buildings, Div. Highways, concrete paving and rein.-con. sewer 0.1799 mi. Sect. 1-CS, in Mount Vernon.

Iowa—Dec. 18, by State Hy. Comn., Ames, grading 0.554 mi. Primary Rd. 101, out of Vinton, North, NRH-NRM 58 DE, Benton Co., incl. 34,083 cu.yd. excav. P.W.A. project. F. R. White, ch. engr.

Kentucky — Jan. 4, by State Hy. Comn., Frankfort, grading, draining, high type surfacing 0.7 mi. Lewisburg-Quality Rd., Logan Co.

Massachusetts—Dec. 18, by Commonwealth of Massachusetts, Dpt. P. Wks., F. E. Lyman, comr., 100 Nashua St., Boston, type "D" bituminous concrete surfacing 17,154 ft. P.W.A. Project R-7, Docket 2838, Braintree and Quincy. To exceed $125,000.

Missouri—Dec. 20, by State Hy. Dpt., Jefferson City, graveling 0.151 mi. Route SE, Rockport-Langdon Rd., Atchison Co.; 0.132 mi. Route SA, Fairport-Maysville Rd., DeKalb Co.; 0.246 mi. Route SA, Chillicothe-Northwest, Livingston Co.; grading 0.331 mi. Route SJ, Atlantic-Elmer Rd., Macon Co.; 0.141-mi. Route 54, East of Mexico, Audrain Co.; 0.179 mi. Route Se, Silex-Olney Rd., Lincoln Co.; 0.125 mi. Route 36, approaches to Mississippi River Bridge, Marion Co.; crushed stone or gravel surfacing 0.719 mi. Route SAA, Hannibal-Ilasco Rd., Ralls Co.; 0.123 mi. Route ST, NRS 519, Bible Grove-Route 15 Rd., Scotland Co.; 1 mi. Route SD, Sect. M12, Ralls Co.-Linn Rd., West, Monroe Co.; 4.5 mi. Route SB, Sect. M11, Audrain-County-Route D Rd., 4.2 mi. Route SD, Monroe Co.-Route 19 Rd.; 5.8 mi. Route SH, Center Rd., North; 1.298 mi. Route SP, Sect. 1A, Route 19 South, all foregoing Ralls Co.; 11 mi. Route SA, Bowling Green-Southwest Rd., Pike Co.; 0.517 mi. Route SE, Sect; NRS 540 Orrick-Camden Rd., Ray Co.; 0.375

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†*Federal Government.*

Streets and Roads (Continued)

mi. Refund 1 to Montgomery City-Danville Rd., PWA 76. SH, Montgomery Co.: 1.15 mi. Route 30. NRH 351E St. Clair Rd. East; 0.254 mi. Route 30, NRM 351F, St. Clair Rd., both Franklin Co.: 0.344 mi. Route 61-NRM 185E, in Crystal City, Jefferson Co.: 0.047 mi. Route SK, NRS 517, Liberal Rd. East, Barton Co.: 2.794 mi. Route SC, NRS 516 B Route 57-Route B Rd.: 4.008 mi. Route ST, NRS 516A Carl Junction-Kansas Line Rd., 6.662 mi. Route ST, NRS 516C, Carl Junction-Route T Rd., all foregoing Jasper Co.; 6.662 mi. Route ST, Vista-Gerster Rd., St. Clair Co.; 9.3 mi. Route SJ, NRS 399D, Aldrich-Eldora Rd., Polk Co.; 3.022 mi. Route SJ, NRS 502A, Duncan-Hartville Rd., Wright Co.; 7.08 mi. Route SM NRS 501 A and B, Clarkton-White Oak Rd., Dunklin Co.; 1.287 mi. Route 63, NRM 263C and D, Kirksville, Adair Co.; 0.299 mi. Route 61 TR, NRH 471 A, Page Ave. Viaduct, St. Louis Co.; 0.113 mi. Route SJ, NRS 530-Diamond-Wentworth Rd., Newton Co. T. H. Cutler, ch. engr.

New Hampshire—State Hy. Dpt., Concord, withdrew from letting of Nov. 28, gravel surfacing 1.009 mi. Daniel Webster Hy., Stratford, Coos Co. Will re-advertise. Noted Nov. 22.

N. Y., Brooklyn—Dec. 19, by R. V. Ingersoll, pres. Brooklyn Boro. Boro Hall, asphalt paving East 24th and 47th Sts.; grading Voorhies and Ocean Aves.; granite paving Waterbury St.

N. Y., New York—Dec. 18, by S. Levy, pres. Manhattan Boro, Municipal Bldg., grading, curbing, flagging, sidewalks, sheet asphalt on 6 in. concrete paving Park Terrace; grading, widening, granite block widening and repaving 40th St.

North Carolina—Dec. 18, by State Hy. & P. Wks. Comn., Raleigh, bituminous surface treating 13.18 mi. Project 1271, Edgecombe Co., $52,000; 10.82 mi. Project 2871, Wayne Co., $38,000; 3.9 mi. Project 7271, Caldwell Co., $14,000; concrete widening 1.08 mi. Project 1612, Nash Co., $9,000; 3.75 mi. Project 4872, Wake Co., $28,000; sand asphalt paving 7.71 mi. Project 2010, Carteret Co., $80,000; structure between Elizabethtown and Clinton, Project 3081, Bladen Co., $12,000; structure between Aberdeen and Laurinburg, Project 6814, Hoke Co., $7,000; grading, structures 1.8 mi. Project 690, Stanly Co., $25,000; concrete paving 0.65 mi. approaches to bridges over Lumber River, Project 3881, Robeson Co., $19,000; grading, structures, topsoil surfacing 7.77 mi. Project 4304, Granville Co., $51,000; grading, topsoiling 8.56 mi. Project 6061, Anson Co., $41,000. W. V. Baise, Raleigh, acting engr.

North Dakota—Dec. 21, by State Hy. Dpt., Bismarck, oil mix surfacing 5.237 mi. Michigan Rd. East, NRH and M 70A, Nelson Co., $28,600; 9.99 mi. Steele Rd. East, NRH and M 306 AB and NRM 407A, Kidder Co., $54,-332; grading, graveling 12.351 mi. Velva North, NRS 451, McHenry Co., incl. 54,580 cu.yd. unclassified excav., $32,711; graveling 2.989 mi. Finley West, NRS 516, Steele Co., $6,000; 9.448 mi. Osnabrock Rd., North and South, NRS 461, Cavalier Co., $18,000; 5.518 mi. North of Esmond, NRS 529, Benson Co., $6,000; 7.567 mi. Picardville North, NRD 487, Sheridan Co., $7,000. T. G. Plomasen, comr.

North Dakota—Dec. 21, by State Hy. Dpt., Bismarck, graveling, grading, 14.84 mi. Upham Rd. West, NRS 504, McHenry Co. T. G. Plomasen, hy. comr.

Ohio—Dec. 22, by O. W. Merrell, dir. hys., Columbus, grading, draining, widening with bituminous base and hot mixed asphaltic concrete paving 2.214 mi. Sect. "R" Hillsboro-Washington CH. Rd., Highland Co., $56,737; hot mixed asphaltic concrete paving 2.31 mi. Sect. "J" Ashland-Oberlin Rd., Lorain Co., $69,-732; grading, building culvert, constructing 4 ft. sidewalk and concrete paving 0.302 mi. Sects. "A" and "Marietta" (part) Marietta-Acme Rd., Washington Co., $33,385.

Oregon—Dec. 20, by State Hy. Comn., Public Service Bldg., Portland, grading 1.8 mi., crushed rock surfacing 0.8 mi. and bituminous macadam paving 8.5 mi. White Rock-Lakeview, Sect., Fremont Hy., 20 ft., Lake Co.; 1.4 mi. North Medford Sect. Pacific Hy.; 11.88 mi. South Ashland Sect., Pacific Hy., both 30 ft., Jackson Co.; 9.2 mi. Trihorn Buston Sect., Nehalam Hy., 20 ft., Columbia Co.; resurfacing 1.91 mi. Pittsburg Verona Sect., Nehalam Hy., 20 ft., Columbia Co.; grading, concrete and asphaltic concrete paving 0.54 mi. 3rd St. to 15th St., Corvallis, 30 ft., Benton Co. R. H. Baddock, Salem, state hy. engr.

Pennsylvania—Dec. 21, at office S. S. Lewis, secy. Hys., Harrisburg, rein.-con. paving, rein.-con. bridge on 8,610 ft. R-37015. Sect. 2, Taylor Twp., Lawrence Co., involving 20,634 cu.yd. Class 1 and 1,935 cu.yd. Class 2 excav.; rein.-con. paving 4,628 ft. R-11, Sect. 9, Kingston Borough, Luzerne Co., 17,342 cu.yd. Class 1 and 400 cu.yd. Class 2 excav.; widening and rein.-con. paving 9,092 ft. R-199, Sect. 5, Pottsville, Schuylkill Co., involving 7,615 cu.yd. Class 1, 20 cu.yd. Class 2, and 1,314 cu.yd. borrow excav.; rein.-con. widening 4,718 ft. R-120, Sect. 11A, Hempfield Twp., Westmoreland Co., 19,758 cu.yd. Class 1 and 473 cu.yd. Class 2 excav.

†*Federal Government.*

Rhode Island—Dec. 19, by State Bd. Public Roads, Providence, rein.-con. paving 0.71 mi. County Rd., Barrington, Bristol Co., NRH 84, Contr. 3414, 2.6 mi. Graniteville-Greenville Rd., Johnston and Smithfield, Providence Co., NRH 85-A, Contr. 3415; bituminous macadam penetration paving 1.047 mi. Bulgarmarsh Rd., Tiverton, Newport Co., NRS 116, Contr. 3416; 0.62 mi. Spring Green Ave., Warwick, Kent Co., NRM 93, Contr. 3417.

Utah—Dec. 20, by State Rd. Comn., Salt Lake City, grading, draining, crushed graveling 4.043 mi. road between Beaver Creek and Monte Cristo, Weber Co., and 9.371 mi. road between Half Way Hollow and Vernal, Vernal, Uintah Co. K. C. Wright, state hy. engr.

West Virginia—Dec. 18, by State Rd. Comn., Charleston, stone base and retread surfacing 5.141 mi. P.W.S. Project 836; Annmore-Barbour Co. Line Rd., Harrison Co.; grading, draining 3.388 mi. P.W.S. Project 823, Ireland-Upshur Rd., Lewis Co.; 7.216 mi. P.W.S. 834 and Project 835-A, Cisko-Kanawha Rd., Ritchie and Wirt Counties; 4.265 mi. Project 822, Rock Cave-Lewis Co. Line Rd., Upshur Co.; steel superstructure 150 ft. span through truss and concrete substructure NRS 299-B, Napier Bridge 1370, Braxton Co.

Wisconsin—Dec. 18, by State Hy. and Burnett Co. Hy. Comns., Madison, bituminous concrete surfacing 157,110 sq.yd. Siren-Danbury Rd., State Trunk Hy. 35, State Project 8484, Burnett Co.

Wisconsin—Dec. 21, by State Hy. Comn., Madison, concrete paving 0.361 mi. Waupaca-Green Bay Rd., (West Mason St. Ext. Sect. 1, from 15th to Norwood Aves.) S.T.H. 54, NRM 543-A, Brown Co., incl. 1,141 cu.yd. earth and 1,826 cu.yd. solid rock excav.; 0.21 mi. Green Bay-Appleton Rd., (North Bway.-DePere) Hy. 41 and S.T.H. 57, Brown Co., 721 cu.yd. earth and 780 cu.yd. solid rock excav.; 0.247 mi. Wautoma-Waupaca Rd., (Wautoma-Relocation) S.T.H. 22, NRM 442-H, Waushara Co.; 0.406 mi. Manitowoc-Sheboygan Rd., (North Rooster-Church Relocation) U. S. Hy. 141, NRH 123, Manitowoc Co., 4,578 cu.yd. earth excav.; bituminous surfacing 0.689 mi. Pewaukee-Watertown-Portage Rd., (East Main St.-Watertown) Jefferson Co.

Wyoming—Dec. 20, by State Hy. Comn., Cheyenne, oil treating by road mix method 7.483 mi. Lusk Newcastle Rd., NRH 194-H and NRH 185-A, and 3.455 mi. Moorcroft-Upton Rd., Weston Co.; 17.375 mi. Lusk Newcastle Rd., NRH 194-E, Niobrara Co.; crushed rock surfacing 17.26 mi. Lusk-Lingle Rd., NRH 150-F, Niobrara and Goshen Counties; 14.097 mi. Rock Springs-Pinedale Rd., NRH 5, Sweetwater Co.; grading, draining, miscellaneous work, 2 timber bridges on 16.461 mi. streets in Pinedale, NRH 140-F NRM 140G FLHP 6B, Sublette Co., incl. 240,100 cu.yd. unclassified and 175 cu.yd. culvert excav.; landscaping 0.317 mi. Casper-Shoshoni Rd., NRH 31, Natrona Co., 2,425 cu.yd. excav.

CONTRACTS AWARDED

Arizona—State Hy. Comn., Phoenix, improving Tempe-Mesa Hy., NRH 8, to Clinton Campbell Contractors, Inc., 90 West Moreland St., Phoenix***and Holbrook-St. Johns Hy., NRH 78-H, to Lee Moor Contg. Co., El Paso, Tex., $59,103. **P.W.A.** Bids Nov. 20.

Arkansas—State Hy. Comn., Little Rock, concrete paving 0.3 mi. approaches to Diaz Overpass Hy. 67, Sect. 17, Jackson Co., Job 5166, and grading, drainage structures, traffic service gravel surfacing 2.7 mi. Junction-Route 24, Whelen Springs Rd., Hy. 3, Sects. 1 and 2, Job 3175, Clark and Nevada Counties, to L. O. Brayton & Co., Dyersburg, Tenn., $12,229 and $22,417 respectively***grading, minor drainage structures, concrete paving 0.5 mi. Waldo City Connection, Hy. 82, Sect. 3, Columbia Co., Job 3222, and concrete paving 0.8 mi. Hartman-Clarksville Rd., Hy. 64, Sect. 4, Job 4154, Johnson Co., to A. C. Kennedy, Poyen, $15,957 and $19,986 respectively***3 mi. Forrest City-West Memphis, Hy. 70, Sect. 19, Job 198, St. Francis Co., to Sandy Hites Co., City Bank Bldg., Kansas City, Mo., $70,139. Grand total $140,728.

California — State Hy. Comn., Sacramento, grading, bituminous treated crushed gravel or stone surfacing 1.6 mi. hy. between points 1 mi. east of Taft and ¼ mi. west of Taft, Kern Co., to D. O. C. Constr. Co., La Arcada Bldg., Santa Barbara, $39,875. Bids Nov. 21, awarded Nov. 27. Noted Nov. 15.

†**Colorado**—Pub. Rds., Custom House, Denver, grading 8.053 mi. Rocky Mountain Natl. Park, to C. V. Hallenbeck, 251 Kalamath St., Denver, $103,494. Bids Nov. 13, awarded Nov. 30.

†**Colorado**—Pub. Rds., Custom House, Denver, grading 3.158 mi. Black Mesa Hy., Project NR 11-C, Montrose Co., to Pioneer Constr. & Eng. Co., 591 Dunham Bldg., Denver, $81,560. Bids Nov. 15.

Colorado—State Hy. Dpt., Denver, gravel surfacing 0.36 mi. hy. between Denver and Golden on State Hy. 58, NRS 372-B, Jefferson Co., to Lawrence Constr. Co., 112 South Elati St., Denver, $26,720. **P.W.A.** Bids Nov. 21, awarded Nov. 28.

Connecticut — State Hy. Dpt., State Office Bldg., Hartford, sheet asphalt on concrete paving 1.071 sq.yd. intersection Edgewood Ave. and Boulevard, New Haven, to Webb Asphalt Paving Corp., Middletown Ave., New Haven, $7,384 ***rein.-con., bituminous macadam and sheet asphalt paving 13,615 ft. hy., Bristol, to Lane Constr. Corp., 35 Colony St., Meriden, $114,-475***waterbound macadam paving 8,550 ft. North St., Route 8, 5, Hebron, to A. I. Savin Constr. Co., 408 Main St., East Hartford, $46,-661. Grand total $168,520. **P.W.A.** Bids Nov. 5. Noted Nov. 13.

Ill., Henry—Dpt. P. Wks. & Buildings, Div. Hys., concrete paving 0.9832 mi. Sect. L-CS, to Trompeter Constr. Co., Peru, $67,739.

Ill., Monmouth—Warren Co., graveling 4.5 mi. Monmouth-Abingdon Rd., and Kirkwood-94A Rd., to F. E. Weir Constr. Co., Moline, $52,-800. T. J. Bonderer, Monmouth, co. engr.

Ind., Albion—Noble Co., bituminous much paving 8 mi. roads through Bakerstown, 24 ft., to R. A. Wilkes & Co., Ligonier, $25,000. J. O. Simpson, Albion, aud.

Ind., Danville — Hendricks Co., bituminous liquid asphalt surfacing 8.1 mi. roads through Maplewood, 22 ft., to W. P. Rigdon, Pittsboro, $23,216.

Ind., Covington—Fountain Co., Z. A. Helms, aud., bituminous mulch paving 8.5 mi. roads through Coal Creek, 22 ft., to C. P. Galloway, Veedersburg, $28,132. Z. A. Helms, Covington, aud.

Ind., English—Crawford Co., A. G. Stephenson, aud., bituminous liquid asphalt paving 8.2 mi. roads through Tower, 25 ft., to Simpson Bros., Grantsburg, $24,115.

Ind., Fowler—Benton Co., bituminous liquid asphalt surfacing 8 mi. roads through Wadena, 25 ft., to J. Donahue, Earl Park, $22,192. J. M. Heimen, Fowler, aud.

Ind., Monticello—White Co., bituminous macadam paving 8.4 mi. roads through Norway, 25 ft., to North & Murray, Monon, $26,000. H. C. Fisher, Monticello, aud.

Ind., Newport—Vermillion Co., C. B. Cooper, aud., bituminous macadam paving 7.9 mi. roads through Dana, 22 ft., to E. H. Spellman, Clinton, $24,500.

Ind., Rensselaer—Jasper Co., bituminous macadam paving roads through Newland, 25 ft., to A. Schriner, Remington, $23,600. K. F. Allman, Rensselaer, aud.

Ind., Williamsport—Warren Co., J. W. Franklin, aud., bituminous mulch surfacing 7.7 mi. roads through Pence, 24 ft., to A. O. Goodwine, Williamsport, $22,500.

Kansas—State Hy. Comn., at office of County Clerk, Ellsworth, (**P. means Project**), concrete paving 0.429 mi. hy. and roadside improvement on 0.429 mi. P. 50N-18-NRM 290-D, McPherson Co., to Stamey & Tidd, Hutchinson, $30,056 and $38 respectively***concrete paving and roadside improvement on 3.227 mi. P. 408-14-PWS 5, Ellsworth Co., to H. J. Taylor Constr. Co., Salina, $82,060 and $220 respectively*** earthwork and culverts on 2.506 mi. P. 13-7-PWS, Morris Co., to Kepler Bros., Kansas City, $36,635***sand gravel surfacing 15.2 mi. P. 36-21-6316, Republic Co., to San-Ore Constr. Co., McPherson, $4,408***roadside improvement 2.506 mi. Morris Co., to Cook Gardens, Ottawa, $391. Grand total $153,808. **P.W.A.** Bids Nov. 20, awarded Nov. 26. Noted Nov. 8.

Kentucky — State Hy. Comn., Frankfort, traffic bound limestone paving 1.86 mi. Hopkinsville-Clarksville Rd., Christian Co., to Corum Bros., Madisonville, $4,535***3,049 mi. Marion-Providence Rd., Crittenden Co., to Alexander & Hopson, Cadiz, $14,693***grading, draining 6.631 mi. Jonesville-Williamstown Rd., Grant Co., to Ruth Bros., Frankfort, $32,001***0.719 mi. Howardstown-Raywick Rd., Nelson Co., to F. J. Snider, Elizabethtown, $17,463***(following are P.W.A. projects) 9.614 mi. Foree's Corner-Lane's Landing Rd., Henry Co., to Caldwell Stone Co., Danville, $63,061***rock asphalt surfacing, mix binder 0.739 mi. 9th St., Russellville, Logan Co., to Ralph E. Mills Co., Frankfort, $41,444***grading 7.32 mi. Uniontown-Spring Grove Rd., Union Co., to Frazer & Cocke, Wickliffe, $36,129. Grand total $209,-327. Bids Nov. 23, awarded Nov. 27. Noted Nov. 15.

Kentucky—State Hy. Comn., Frankfort, grading, draining 5.121 mi. Fredonia-Flat Rock Rd., Caldwell Co., to R. F. Pryor & Co., Mayfield, $25,562***2,933 mi. Arlington-Columbus Rd., Carlisle Co., to McDade & McDade, Fulton, $19,931***traffic bound limestone surfacing 1.875 mi. Brodhead-Eubank Rd., Rockcastle Co., to Robertson & Webb, Shelbyville, $7,240*** rock asphalt paving 1.103 mi. Mt. Vernon Ave. and Ohio St., Somerset, Pulaski Co., to Ken-

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Streets and Roads (Continued)

tucky Road Oiling Co., Frankfort, $42,608, latter project is **P.W.A.** Grand total $95,341. Bids Nov. 9, awarded Nov. 27. Noted Oct. 25 and Nov. 1.

New Jersey—State Hy. Comn., Trenton, grading 1.253 mi. Burlington Co., to Riverside Concrete Co., Riverside, $74,787. **P.W.A.** Bids Dec. 3. Noted Nov. 22.

†New Mexico—Pub. Rds., Denver, Colo., surfacing 5.384 mi. Carrizozo-Rosewell Forest Hy., Lincoln Co., to Dudley Stone Products Co., 2101 San Diego St., El Paso, Tex., $47,714. Bids Nov. 15, awarded Dec. 1.

Ohio—O. W. Merrell, dir. Hys., Columbus, grading, draining, placing accelerated traffic bound material with oil binder, 1.779 mi. Sects. "A-1" and "Findlay" (part) Ottawa-Findlay Rd., Hancock Co., to C. E. Edgington, Findlay, $22,384; conerete paving 1.3 mi. Sect. "B" Barberton-Greenwich Rd., Huron Co., to Dunn & Roller, Carey, $44,016. **P.W.A.** Bids Nov. 24.

Ohio—O. W. Merrell, dir. Hys., Columbus, grading, drainage structures, westphalt resurfacing, widening, and constructing parking strips on each side of roadway, on 2.041 mi. Sect. "A" and "Tiffin" (part) Upper Sandusky-Tiffin Rd., Seneca Co., to Seneca Constr. Co., Fostoria, $106,500; grading, building culverts, concrete paving 1.466 mi. Sect. "Marietta" Marietta-Highwater Rd., Washington Co., to G. B. Patterson, Wellsville, $78,524. **P.W.A.** Bids Nov. 30. Noted Nov. 22.

Oregon — State Hy. Comn., Portland, grading, pipe and culverts 0.39 mi. Douglas Co., to Haskins & Brooke Constr. Co., LaCenter, $40,364***widening, surfacing 5.58 mi. Holdman Meinens Ranch Sect. Pendleton Cold Spring Hy., to Newport Constr. Co., Governor Bldg., Portland, $36,571***2 blocks Golden Johnson Sect. Marshfield-Oregon Coast Hy., Coos Co., to R. I. Stewart, Medford, $12,150***10 blocks in Portland, to Kern & Kibbie, 290 East Salmon St., Portland, $92,504. Grand total $181,589. Bids Dec. 6.

Pennsylvania—At office S. S. Lewis, secy. Hys., Harrisburg, bit. surface course Spec. "E" on broken stone paving and rein.-con. bridge 0.12 mi. E Route 326, Solebury Twp., Bucks Co. (State project), to J. F. Keelor, Green Lane, $28,748***rein.-con. paving 1.34 mi. Route 157, Sect. 7A, Kutztown Boro and Maxtawny Twp., Berks Co., (P.W.A. project), to H. R. Miller Co., Box 1235, Lancaster, $80,616. Bids Nov. 23. Noted Nov. 15.

Pennsylvania—At office S. S. Lewis, secy. Hys., Harrisburg, rein.-con. widening 1.15 mi. Route 157, Sect. 9, Reading, and Muhlenberg Twp., Berks Co., to D. L. Risser, 713 Walnut St., Lebanon, $63,240. **P.W.A.** Bids Nov. 9. Noted Nov. 1.

Oklahoma—State Hy. Dpt., Oklahoma City, to T. C. Ottinger, Hinton, grading, drainage 7.699 mi. Latimer Co., $29,810 est. $30,000; 2.466 mi. Latimer Co. $13,314 est. $14,713; 3.372 mi. Harper Co. $35,170 est. $37,861*** to E. D. Reed, Clay Center, Kan., 0.512 mi. in Pawnee Co. $12,542 est. $14,000***to Kadane Constr. Co., Frederick, 1.965 mi. Okmulgee Co. $12,842 est. $13,627***to Park Ward Co., 808 East 17th St., Oklahoma City, $77,219 est. $73,189; concrete paving 3.474 mi. Harmon Co. $87,198 est. $83,850***to S. O. Moxey & Co., Durant, concrete paving 3 mi. Cotton Co. $82,895 est. $85,616; 0.499 mi. Cotton Co. $18,822 est. $18,140***to M. A. Connelly, El Reno, 0.25 mi. Comache Co., $23,316 est. $24,267***to Hyde Constr. Co., Enid, 0.318 mi. Major Co. $10,850 est. $10,934***to Highway Constr. Co., Daniels Bldg., Tulsa, 0.108 mi. Johnson Co. $17,302 est. $15,182***to L. S. Fisher, Woodard, 0.655 mi. Harper Co. $36,769 est. $37,840. Grand total $468,049. **P.W.A.** Bids Dec. 4.

Texas—G. Gilchrist, state hy. engr., Austin, grading, drainage structures 15.71 mi. State Hy. 5, NRH-M 595 B and F, Montague Co. and 5.722 mi. State Hy. 5, NRH 596-C, Clay Co., to Womack-Henning Constr. Co., Abilene, $119,020 and $25,967 respectively est. $130,000 and $40,000 respectively***13.071 mi. State Hy. 5, NRH 438-C and NRM 438-K, Donley Co., to McKnight Co., Amarillo, $54,901 est. $70,000 ***9.05 mi. State Hy. 1, NRH 399-A, Hudspeth Co., to L. J. Miles, 1809 Clover Lane, Fort Worth, $58,771 est. $80,000***10.956 mi. State Hy. 5, NRH-M 438-D and L, Donley Co., to T. M. Brown & Son, Brownwood, $69,046 est. $80,000***single bituminous on caliche base surface treating 11.817 mi. State Hy. 3, NRH 378-F, Brewster Co., to H. B. Zachary, Laredo, $75,917 est. $100,000***triple asphalt on caliche base surface treating and drainage structures 7.599 mi. State Hy. 3, NRH 664-D and NRM 664-C, Presidio Co., to Altamar-Knickerbocker, Inc., San Antonio, $75,770 est. $100,000 ***grading, drainage structures, double asphalt on caliche base surfacing 5.705 mi. State Hy. 206, NRH-M 757-B and C, Eastland Co., to E. F. Bucy & Sons and C. T. Childs, Rising Star, $46,847 est. $50,000***grading, double asphalt on caliche base course surface treating 7.603 mi. State Hy. 1, NRH 263-B Ward Co., to W. A. Ralls, El Paso, $91,472 est. $110,000***concrete paving 9 mi. State Hy. 71, NRS 779, Colorado Co., to C. W. Hobson, 3700 Maplewood St., Dallas, $157,907 est. $160,000***0.781 mi. State Hy. 4, NRH 146, Delta Co., and 15.143 mi. State Hy. 6, NRH 471-I and G, Brazos Co., to Union Constr. Co., Dallas, $24,876 and $291,463 respectively est. $20,000 and $300,000 respectively***7.746 mi. State Hy. 4, NRH 573-D, Collingsworth Co., to Combs & Glade, Wichita Falls, $148,099 est. $160,000. Grand total $2,066,056. **P.W.A.** Bids Nov. 26.

Texas—G. Gilchrist, state hy. engr., Austin, grading, drainage structures 10.335 mi. State Hy. 10, S.P. 904-D, Iron Co., to E. F. Bucy & Sons, and C. T. Childs, Rising Star, $102,792, est. $120,000***12.136 mi. State Hy. 15, S.P. 292, Harrison Co., to Gifford-Hill & Co. 412 Merchantile Bldg., Dallas, $141,288 est. $160,000***5.862 mi. State Hy. No. 2, S.P. 28-C, Hays Co., to Word & Worrell, Austin, $52,128 est. $60,000***3.109 mi. State Hy. 22, S.P. 251-D, Rusk Co., to Buckner Bros., Cleburne, $33,780 est. $40,000***asphalt surfacing 15.775 mi. State Hy. 81, S.P. 181 and 109, Comanche Co., to Morgan Constr. Co., Tower Petroleum Bldg., Dallas, $24,876 est. $40,000. Grand total $354,864. Bids Nov. 26.

Texas—G. Gilchrist, state hy. engr., Austin, concrete paving 14.955 mi. State Hy. 38, NRH 637-A, Fort Bend Co., to Harrison Eng. & Constr. Co., 903 Fairfax Bldg., Kansas City, Mo., $282,763. Est. $300,000. **P.W.A.** Bids Nov. 26.

Tex., Sinton—San Patricio Co., road improvement, hard surfacing, 10 in. rock and shell base course with 2 in. rock asphalt topping 10.2 mi. hy., to Holland Page, Norwood Bldg., Austin and Corpus Christi, $83,069.

†Washington — Pub. Rds., 316 Post Office Bldg., Portland, Ore., clearing work on Stevens Canyon Hy., Mount Rainier Park, to Erickson, Johnson & Smith, Naches, $19,110. Bids Dec. 5.

Wisconsin—State Hy. Comn., Madison, grading, draining 5.754 mi. Sawyer and Washburn Counties, to H. S. Kalliher, Washburn, $26,948 ***1.902 mi. Buffalo Co., to Nelson, Mullen & Nelson, 355 Gateway Bldg., Minneapolis, Minn., $76,567. **P.W.A.** Bids Nov. 20. Noted Nov. 8.

Wisconsin—State Hy. Comn., Madison, grading, draining 2.407 mi. Buffalo Co. and 7.41 mi. Trempealeau Co., to Griffis Bros. Constr. Co., 5528 Nicholet Ave., Minneapolis, Minn., $82,755 and $85,243 respectively. **P.W.A.** Bids Nov. 27. Noted Nov. 15.

EARTHWORK, IRRIGATION DRAINAGE AND WATERWAYS

PROPOSED WORK

†Calif., Newport—U. S. Eng., Los Angeles, rejected bids Nov. 15, dredging 8,482,000 cu. yd. material and 25,640 cu.yd. rock in Newport Harbor. Part will be readvertised and part will be done by force account.

Calif., Paradise — Paradise Irrigation Dist., seeking federal loan to finance raising dam of district to increase water storage facilities. $150,000 or more. Noted Apr. 26.

Calif., San Bernardino — P. B. Hasbrouck, engr., Fontana, announced that supervs. San Bernardino Co., will request State and Federal financing to extent of $500,000 to complete Lytle Creek Flood Control.

Ind., Elkhart—City, plans laying 1,000 ft. 10 in. tile drain for Rice Park, $12,782. E. Brady, city engr.

Okla., Seminole—Seminole Co., Wewoka, made preliminary plans drainage district on Wewoka Creek, near here, $150,000. R. N. Geer, Seminole, engr.

Ont., Niagara on the Lake—Town plans sea wall at Fort Mississauga Reserve, $33,974. Work probably by day labor.

BIDS ASKED

†Arkansas—Dec. 27, by U. S. Eng., P. O. Box 97, Memphis, Tenn., constructing 1,000,000 cu.yd. earthwork in White River Levee Dist., Fair Landing.

†Louisiana—Dec. 17 (extended date), by U. S. Eng., Prytania St. and River Front, New Orleans, 360,000 cu.yd. Item W 28-A, Palmetto-Courtableau Levee. West Atchafalaya Basin Projection Levee; 380,000 cu.yd. Item W 28-B, same levee; and 420,000 cu.yd. Item W 28-C, same levee. Noted Nov. 22.

†Louisiana—Dec. 19 (extended date), by U. S. Eng., Prytania St. and River Front, constructing 740,000 cu.yd. Item W 69-SLD, Catahoula-Danterine Levee; 1,440,000 cu.yd. Item W 69-SLC, same levee; 870,000 cu.yd. Item W 69-SLB, same levee; and 250,000 cu.yd. Item W69-SLA, same levee, all foregoing in West Atchafalaya Basin Protection Levee.

†Minn., Winona—Dec. 27, by U. S. [illegible] Commerce Bldg., St. Paul, clearing pool [illegible] Lock and Dams 5A-1, 5A-2 and 6, in Mississippi River, near here.

Neb., Lincoln—Dec. 21, by Sanitary Dist. 1 of Lancaster Co., W. C. Frampton, secy., 320 Bankers Life Bldg., 905,000 cu.yd. channel excav., 7,500 cu.yd. side drainage excav., removing present inverted siphon structures, removing 400 ft. old 51 in. intercepting sewer, hauling 275 ft. old 51 in. pipe, 1,950 cu.yd. culvert and pipe dry excav., 1,075 cu.yd. culvert and pipe wet excav., 114.4 cu.yd. AA concrete, 667.2 cu.yd. A concrete, 110,000 lb. reinforcing steel, 50 ft. 51 in., 112 ft. 36 in., 52 ft. 30 in. and 178 ft. 24 in. rein.-con. pipe, 5,000 ft. steel rail piling, 276 automobile bollards, 20 cu.yd. rip rap, relaying 275 ft. 51 in. rein.-con., 120 ft. 24 in. and 75 ft. 8 in. vitrified clay pipe. Scott & Scott, 522 Bankers Life Bldg., engrs.

†Nev., Boulder City—Dec. 27, by Bureau of Reclamation, Denver, Colo., constructing cylinder gate hoists, and bulkhead gates for intake towers at Boulder Dam, Boulder Canyon Project, Arizona-California-Nevada.

N. J., Point Pleasant—Dec. 17, by Dpt. Commerce & Navigation, Trenton, dredging 1,100 cu.yd. in Bayhead-Manasquan Canal, Ocean Co., V. Gelineau, State House, Trenton, comr.

Pennsylvania—See "Contracts Awarded."

Pa., Jeannette—See "Contracts Awarded."

LOW BIDDERS

†O., Gallipolis—U. S. Eng., Huntington, W. Va., Dec. 6, constructoing high dam in Ohio River at Apple Grove below here, from Dravo Contg. Co., Neville Island, Pittsburgh, Pa., $3,117,518. Noted Nov. 22.

CONTRACTS AWARDED

†Calif., Newport—See "Proposed Work."

†Louisiana—U. S. Eng., 2nd Dist., 132,000 cu.yd. levee work on Red River, to Central Constr. Co., Inc., Monroe, $5,088. Bids Nov. 14.

†Mississippi—U. S. Eng., Post Office Box 97, Memphis, Tenn., concrete cap and apron over and around end spur levee near Friar Point, to Upper Yazoo Levee Dist., to Henry Hughey Co., Inc., 510 Fidelity Bank Bldg., Memphis, Tenn., $9,600. Bids Nov. 26. Noted Nov. 22.

†Mississippi—U. S. Eng., P. O. Box 667, Vicksburg, constructing 6,400 cu.yd. earthwork on east bank of Yazoo River in Rocky Bayou Levee and Drainage Dist., to Linwood Smith, Lake Village, Ark., $2,207. Bids Nov. 30.

Neb., Columbus—Loup River Public Power Dist., C. B. Fricke, pres., reservoir and canal earthwork, incl. 1,200,000 cu.yd. excav. in canal and borrow, compacting 850,000 cu.yd. canal embankment, constructing 350,000 cu.yd. roller reservoir dike, 150,000 cu.yd. unrolled reservoir levee and 8,500 cu.yd. concrete with 500 tons reinforcing steel, to P. Kiewit Sons, 4521 Dodge St., and G. W. Condon, 219 Grain Exch. Bldg., Omaha, Neb., $462,510. **P.W.A.** Bids Nov. 22. Noted Nov. 15.

Neb., Paxton—Platte Valley Public Power & Irrigation Dist., G. Gentlemen, secy., North Platte, constructing supply canal part of Sutherland Project, to Hardwick Co., Memphis, Tenn., $380,476. **P.W.A.** Bids Nov. 14. Noted Nov. 8.

N. J., Point Pleasant—Dpt. Commerce & Navigation, State House, Trenton, creosoted timber bulkheads and untreated timber bulkhead returns in Bay Head-Manasquan Canal, Ocean Co., to Gray Constr. Co., Morristown, $14,274. Bids Dec. 3. Noted Nov. 29.

†Ohio Dennison—U. S. Eng., Zanesville, constructing Tappan Dam, near here, to Sammons Robertson Co., Huntington, W. Va., $387,450. Bids Nov. 13. Noted Oct. 25.

†O., Mansfield—U. S. Eng., Zanesville, constructing Charles Mill Dam on Black Fork Mohican River, near here, to Ryan & Myers, Campbellsburg, Ind., $313,894. Bids Nov. 15. Noted Nov. 1.

Pennsylvania—Fayette County RWD, J. A. Topliss, executive dir., Uniontown, draining swampy land at South Everson, by construction of 1,700 ft. channel, $10,000; developing athletic field in North Union Twp., $11,500***; school repairs in Washington Twp., $2,000; day labor under supervision of executive dir. **Maturity at once.**

Pa., Jeannette—Westmoreland Co., c/o Commissioners, constructing No. 2, dry dam north of here as part of Bull Run flood control project, day labor. $22,241. RWD project. $8,241 allotted for materials.

†Pa., Pittsburgh—U. S. Eng., Pittsburgh, demolishing and removing old Lock and Dam 2, Allegheny River, near Aspinwall, to Mongahela

†Federal Government

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Earthwork, etc. (Continued)

& Ohio Dredging Co., Oliver Bldg., $48,432. Bids Nov. 5.

†Va., Alexandria—U. S. Eng., Wash., D. C., dredging 290,250 cu.yd. from Potomac River, to Norfolk Dredging Co., Norfolk, $43,102. Noted Oct. 25.

†Va., Norfolk—U. S. Eng., Norfolk, dredging 37,600 cu.yd. from Meherrin River, N. C., to C. Wallser, Hodges Dredging Co., New Bern, N. C., $9,324. Bids Nov. 15. Noted Nov. 1.

†Wash., Seattle—U. S. Eng., dredging from East Waterway, Seattle Harbor, to General Constr. Co., 3840 Iowa St., $8,800***640,000 cu.yd. from Duwamish Waterway to Puget Sound Bridge & Dredging Co., 2929 16th Ave., $96,000. Bids Nov. 15. Noted Nov. 1.

Alta., Bow River—Dpt. P. Wks., Ottawa, Ont., sheet pile protection wall, to Marmix & Owens, Calgary, $59,197. Est. $150,000.

UNCLASSIFIED

PROPOSED WORK

Ala., Gadsden—SWIMMING POOL—City, A. Cooke, engr., plans municipal pool. P.W.A. approved application for $136,000 loan and grant.

Calif., Oakland—HANGAR—City Port Comn. making plans 20x50 ft. extension to navy hangar, Engineering Dpt., City Port Comn., engrs.

Calif., San Francisco—ELEVATORS—W. W. Felt, Jr., secy. Golden Gate Bridge & Hy. Dist., 111 Sutter St., San Francisco, rejected bids Oct. 31, furnishing, installing 2 service elevators, one in each of Marin and San Francisco Towers of Golden Gate Bridge. $40,000.

Calif., Tulare — ELECTRIC DISTRIBUTING SYSTEM—City plans election in January to vote bonds to finance purchase and improvement of system now owned and operated by Southern California Edison Company. $250,000.

Conn., Derby—PARK DEVELOPMENT—City, W. Riordan, mayor, making plans park development on 75 acre Coon Hollow property (purchased for $5,000) and will be developed as recreational and municipal park center. FERA project. To exceed $50,000.

Ky., Bellevue—TRACTION LOOP IMPROVEMENT—Cincinnati, Newport & Covington Ry. Co., Covington, plans improvement to traction loop, track work, etc. $37,000.

N. Y., New York — TOMB and BURIAL VAULT — Holy Cross Armenian Apostolic Church, 578 West 187th St., bids after Feb. 1 on revised plans tomb and burial vault, 578 West 187th St. To exceed $28,000. H. Exerjian, 148 East 33rd St., archt. Noted Nov. 29.

†N. C., Pope Field — NIGHT LIGHTING SYSTEM—U. S. Eng., Fort Bragg, rejected bids Nov. 28, constructing night lighting system at Air Corp Hangar, Pope Field. Will readvertise.

O., Mingo Junction—COAL LOADING TERMINAL—Pittsburgh & West Virginia R.R., Wabash Bldg., Pittsburgh, Pa., plans coal loading terminal. To exceed $100,000.

Pa., Phila.—STEEL TANKS—Stokes & Smith Co., Summerdale Sta., plans installing 6 steel tanks for storage of phenol at Summerdale Ave. and Reading R.R. Est. $2,000.

Pa., York — STABLES and FENCE — York County Fair Assn., York, bids early in 1935 for razing old stables at Fair Grounds, erecting new stables and enclosing track with ornamental iron fence. $30,000. Noted Oct. 18.

Tennessee—OIL and GAS DEVELOPMENT—Glen & Faust, La Grange, plans oil and gas development, in vicinity of La Grange, Fayette Co. To exceed $30,000.

Tenn., Dancyville—OIL and GAS PROPERTIES DEVELOPMENT—Mid Continent Development Co., plans developing oil and gas properties. $30,000 or more.

Tex., Jefferson—OIL and GAS POPERTIES DEVELOPMENT—Arkansas Fuel Oil Co. and K. C. Bundy, Jefferson, plan developing 10,000 acres oil and gas properties. To exceed $30,000.

BIDS ASKED

Calif., San Francisco—CONVEYOR, etc.—See "Contracts Awarded."

†Conn., Norwich—MAILING PLATFORM—Dec. 17, by Treas. Dpt. at office Sup. Archt., Wash., D. C., repairing mailing platform at Norwich Post Office.

Neb., Beatrice — TRANSMISSION LINE — Southeastern Public Power Dist., bids about Feb. 4, 600 mi. single-phase 2,300 volt to 6,600 volt electric transmission lines in Gage and surrounding counties, incl. 13,000 poles, $86,000, cross arms $9,200, wire and equipment, $90,000, insulators secondary racks, etc., $12,000, transformers and equipment $120,000, hardware $20,000, meters and equipment $18,000, and miscellaneous items $4,000. $575,000. P.W.A. loan and grant allotted. L. C. Black, dist. engr. Noted Jan. 25.

N. Y., Syracuse—AIRPORT IMPROVEMENTS—See "Contracts Awarded."

O., Conneaut — LANDSCAPING, etc. — See "Contracts Awarded."

Pa., Bellevue—SWIMMING POOL—See "Contracts Awarded."

Tex., Kerrville — GAS SYSTEM IMPROVEMENTS—City, c/o R. Holdsworth, mayor, taking bids additions and remodeling gas system, recently purchased from private owners, incl. air and butane mixing machines, color mixer machines, electric motors 25 hp., etc., some c.i. pipe replacement. Address owners direct. A. P. Hancock, Kerrville, engr.

Virginia — RAILROAD — See "Contracts Awarded."

CONTRACTS AWARDED

Calif., San Francisco—CONVEYOR, etc.—J. Cassaretto, 6th and Channel Sts., conveyor and aggregate bunker, rock, sand and gravel plant, 6th St. near Berry St., day labor.

Calif., San Jose—RAILWAY—Southern Pacific R.R., 65 Market St., San Francisco, W. Kirkbride, engr., grading right-of-way between Alameda and Lick Station, involving 90,000 cu.yd. earthwork, to E. W. Heple, 494 Delmas Ave. Bids about Nov. 1, awarded Dec. 3. Noted Nov. 1.

Conn., Willimantic — PARK DEVELOPMENT—City, P. Wks. Dpt., park development, incl. spring water lake, 150x250 ft., half to be utilized for wading pool, constructing roadway around lake, stone building, pipe line from Spring to lake, also a series of beautifying water falls, Whittemore Park, Jackson St. Owner builds FERA labor. To exceed $17,750. J. F. Collins, City Hall, engr.

Ill., Chicago—ELEVATED RAILWAY—Chicago Rapid Transit Co., 72 West Adams St., repairing elevated railway in stockyards district, to Hansell-Elcock Co., Archer and Normal Aves. Est. exceeds $30,000.

La., New Orleans—LIGHTING SYSTEMS—State, through State Advisory Bd. and City, by and through Public Belt R.R. Comn., at Council Chamber, City Hall, furnishing all work and material required to complete, test and put into operation lighting system for Mississippi River Bridge, (under construction), to White Way Corp., Milwaukee, Wis., $60,759. Bids Nov. 22, awarded Dec. 4. Noted Nov. 15.

†La., New Orleans — WHARF — Superintendent Lighthouses, New Orleans, deck wharf, concrete on creosoted piles, on site of proposed Lighthouse Depot, Industrial Canal, to R. H. Sharp & Co., American Bank Bldg., $67,340. Bids Nov. 12. Noted Oct. 25.

†Mass., Chelsea — WHARF — Superintendent Lighthouses, 2nd Lighthouse Dist., repairing and extending timber wharf at Lighthouse Depot, on Marginal St., incl. new stringers, girders, bracing, bearing piles, fender piles and dolphins, to Rendle Contg. & Docks Bldg. Co., Inc., 364 Border St., East Boston, $4,950. Bids Nov. 13, awarded Dec. 3. Noted Nov. 8.

N. Y., Brooklyn — BULK STORAGE and TANKS—Chapman Dock Co., 1105 Metropolitan Ave., altering storage and tanks, Maspeth and Gardiner Aves., separate contracts awarded. $30,000. M. Cafiero, 391 Fulton St., archt. Noted Nov. 27.

N. Y., Brooklyn—COAL STORAGE, etc.—Flatbush Coal Co., McDonald Ave. and Avenue S, general contract coal storage pockets, etc., to Nicholson Co., 405 Lexington Ave., New York. Est. $28,000. W. Neil, 405 Lexington Ave., New York, archt. Noted Nov. 29.

N. Y., Syracuse—AIRPORT IMPROVEMENTS—City, W. A. Barry, comr., 3,000 ft. and 2,180 ft. black top, hardsurfaced runways, complete drainage system, at airport and constructing aprons in front of hangars, by day labor. Est. $123,000. TERA project. Noted Oct. 11.

O., Conneaut — LANDSCAPING, etc. — City, landscaping Lake View Park, $8,740; grading, landscaping and laying c.i. water main to East Conneaut cemetery, $2,575***landscaping Farnham School athletic field, $6,076 leveling and repairing sidewalks, $5,200, day labor under supervision of City Eng. Dpt. FERA projects approved. Noted Oct. 11, under "Waterworks."

Pennsylvania — ATHLETIC FIELD — See "Earthwork, Drainage, Irrigation and Waterways."

Pa., Bellevue—SWIMMING POOL—Municipality, constructing municipal swimming pool, day labor. $60,000 bonds voted for same. Noted Nov. 22.

Virginia — RAILROAD — Norfolk & Western Ry., W. P. Wiltsee, ch. engr., Roanoke, constructing 38 mi. or more railroad along Levisa River, Buchanan Co., to reach coal deposits, day labor and separate contracts.

Que., Baie St. Paul—WHARF—Dpt. P. Wks., Ottawa, Ont., wharf extension, to G. Velieneauve, Point-Au-Pic, $24,522. Est. $30,000.

Que., Mont Louis—WHARF—Dpt. P. Wks., wharf extension, to W. Harney, Grand River, $34,236. Est. $45,000.

MATERIALS AND EQUIPMENT

PROPOSED WORK

GARBAGE TRUCK—**Oroville, Calif.**—City to have specifications made for all steel garbage truck equipped with automatic hoist and dumping device.

SAND — **Minneapolis, Minn.** — City, F. S. Gram, city purch. agt., cancelled bids to have been opened Nov. 19, 5,000 cu.yd. sand delivered to city trucks at pit. City will operate own pit. Noted Nov. 15.

TANK—**St. Louis, Mo.**—S. J. Dielschneider, 7153 Landsowne Ave., granted permit to install 1,000 gal. underground steel tanks for gasoline at automobile filling station, 7153 Lansdown Ave. Noted Nov. 27.

†STONE—**Montana**—U. S. Eng., Kansas City, Mo., rejected bids Oct. 29, 100,000 cu.yd. stone for crushing to be placed in stockpiles, for Fort Peck Dam, $100,000. Noted Oct. 30.

STEEL TANKS — **Buffalo, N. Y.** — Mohican Service Station, 469 Seneca St., plans installing three or four 500 gal. steel tanks at service station. To exceed $1,000.

FIRE TRUCK—**Cheektowaga, N. Y.**—Rescue Hose Co. No. 1, plans purchasing motorized fire truck and equipment to replace unit destroyed by fire. $12,000.

TRACTOR, etc.—**New Waterford, N. S.**—Municipality interested in prices heavy duty tractor and snow plough and grader. L. B. Bates, Town Hall, engr.

BIDS ASKED

GRAVEL—**Mansfield, Ill.**—Dec. 17, by Dpt. P. Wks. & Buildings, Div. Hys., 400 tons gravel for maintenance.

CRUSHED STONE—**Huntington, Ind.**—Dec. 27, by Bd. Comrs. Huntington Co., crushed stone screenings, oak bridge timber, concrete pipe. N. F. Brown, Huntington, aud.

SEWER PIPE—**Kokomo, Ind.**—Dec. 19, by Bd. Comrs. Howard Co., G. Gilbert, aud., sewer pipe, road oil, grader and drag blades.

DUMP BODIES—**Iowa**—Dec. 17, by State Hy. Comn., Ames, five 2½ yd. dump bodies; two 2 yd. dump bodies; sixteen 1½ yd. dump bodies; 5 power spray attachments for tar kettles; 5 discs for cutting bituminous gravel; 3 window measuring devices, two 400 gal. pressure distributors, 1 tank car material heater, 4 rotary brush brooms, 1 bituminous material mixer, 6 mechanical material spreaders, 11 large spray units. H. O. Parsons, aud.

LUMBER—**Leon, Ia.**—Dec. 21, by Decatur Co., 216,000 BM rough standard sawed fir lumber. F. K. Brown, Leon, co. engr.

LUMBER, etc.—**Storm Lake, Ia.**—Dec. 21, by Buena Vista Co., 25,909 ft. BM treated yellow pine lumber; 771 ft. BM untreated lumber; and 878 lin.ft. yellow pine piling. A. H. Cunningham, co. engr.

SIGNAL EQUIPMENT—**Massachusetts**—Dec. 18, by Commonwealth of Massachusetts, Dpt. P. Wks., 100 Nashua St., Boston, F. E. Lyman, comr., 1 pretimed traffic control signal and beacon, part of NRM project 241-B, Revere; 2 flashing beacons, Newburyport, part of NRM Project 130-B; 1 semi-actuated traffic control signal, Auburn.

†WOODEN SCOW, etc.—**Boston, Mass.**—Dec. 17, by U. S. Eng., Custom House, 1 wooden scow for pile driver, delivered afloat at Cape Cod Canal; also steel plates, shapes, rivets, forgings, castings and creosoted lumber to be used at Cape Cod Canal.

†PIPE WRENCHES—**Springfield, Mass.**—Dec. 18, by U. S. Commanding Officer, 787 pcs. strap pipe wrenches, 2 in. capacity, 12 in. long, strap 20 in. long. Circular 43.

†CEMENT—**Vicksburg, Miss.**—Dec. 20, by U. S. Eng., furnishing, delivering portland cement for use at U. S. Waterways Experiment Station.

CUBICLES, etc.—**Nevada**—Jan. 21, by Bureau Reclamation, Denver, Colo., furnishing, delivering 7 control cubicles with equipment; 5 excitation cubicles with equipment; 2 miniature type main control boards with auxiliary equipment; 1 miniature type station service control board with auxiliary equipment; 3 annunciator systems; 4 auxiliary control boards with equipment; 4 terminal boards with equipment; two 115 volt 60 cycle, frequency regulated clock supply power equipment, 5 battery charging sets, 1 battery control switchboard; six 250 volt direct current distribution switchboards; two 460 volt main power boards; two 460 volt station service power boards; five 460 volt power boards; five 460 volt control boards; 5

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†Federal Government.

Materials, etc. (Continued)

thermal panels; miscellaneous 460 volt control panels and equipment; two 115 volt alternating current lighting feeder interrupter cubicles with equipment; miscellaneous 2,300 volt and 16,500 volt switching; relaying and metering for Boulder Power Plant, Boulder Canyon Project.

ASPHALTIC MATERIALS, etc. — **Trenton, N. J.**—State Hy. Dpt., Trenton, taking bids 800,000 gal. asphaltic materials; and 800,000 gal. tar for year 1935.

†CABLE—**Brooklyn, N. Y.**—Dec. 17, by Signal Supply Officer, Army Base, telephone cable and steel reels.

†WIRE—**Brooklyn, N. Y.**—Dec. 17, by Signal Supply Officer, Army Base, 60,000 ft. wire, f.o.b. Army Base, Brooklyn; 15,000 ft. f.o.b. Chicago, Ill.

TRUCK—**Grand Forks, N. D.**—Dec. 28, by Grand Forks Co., 1 truck for use in road work. M. Haugen, co. aud.

CRUSHED STONE and BOULDERS—**Cincinnati, O.**—Dec. 26, by C. E. Lex, Sr., city purch. agt., crushed stone and boulders, to be delivered during 1935 as ordered. $35,000 appropriated.

PAVING PEBBLES, etc.—**Cincinnati, O.**—Dec. 19, by C. E. Lex, Sr., city purch. agt., paving pebbles, sand and gravel, $24,000 approriated; vitr. sewer pipe, miscellaneous sizes, $9,000 appropriated; asphalt filter dust, $4,000 appropriated; common, vitrified and paving brick, $8,000 appropriated. Above to be bought and delivered during 1935 as ordered.

• PORTLAND CEMENT, etc.—**Cincinnati, O.**—Dec. 19, by C. E. Lex, Sr., city purch. agt., portland cement, incl. high early strength, $16,000 appropriated, bituminous paving material, $14,000 appropriated. Above to be delivered during 1935 as ordered.

WATER METERS—**Tomahawk, Wis.**—Dec. 20, by Mrs. E. Fuller, city clk., four hundred sixty-six ¾ in. water meters; supplying materials for installing 416 water meters and 50 outside meters. P.W.A. project. Former bids rejected. Noted Mar. 22.

SAW MILL, CARRIAGE, etc.—**Baptiste, Ont.**—Martin Bros. Lumber Co. in market for supply of portable saw mill, carriage and track, 4 heel blocks.

CYANIDE EQUIPMENT — **Amos, Que.** — Perron Gold Ltd. in market for cyanide equipment for 100 ton mill.

CONTRACTS AWARDED

CASTINGS—**Los Angeles, Calif.**—D. P. Nicklin, purch. agt. Dpt. Water & Power, 207 South Bway., furnishing copper, brass and bronze castings, in such quantities as may be ordered during period of 12 months beginning with date of contract, f.o.b. department and carrier depots. Spec. 1507, to "A" Brass Foundry, 2052 East Vernon Ave., Vernon, $3,918. Bids Nov. 23, awarded Dec. 7.

CEMENT—**Los Angeles, Calif.**—Metropolitan Water Dist., 306 West 3rd St., F. E. Weymouth, engr. and genl. mgr., 1,120,000 to 5,000,000 bbl. portland cement, Spec. 79, to California Monolith, Riverside and Southwestern Portland Cement Co., c/o L. Carvlon, 1120 Bartlett Bldg., $7,000,000. Bids Nov. 27, awarded Dec. 7. Noted Nov. 15.

DISCONNECTING SWITCHES—**Los Angeles, Calif.**—D. P. Nicklin, purch. agt. Dpt. Water & Power, 207 South Bway., furnishing, delivering 23,000 volt outdoor type gang operated by manual mechanism disconnecting switches, inverted type for horizontal mounting, four 3,000 amp., eight 1,200 amp. and four 400 amp., Spec. 1523, to Bowie Switch Co., Los Angeles, $15,627. Bids Nov. 7, awarded Nov. 30. Noted Oct. 25.

MASON SAND, etc.—**Chicago, Ill.**—Dpt. P. Wks., City Hall, mason sand and filling sand, to Material Service Corp., 30 North LaSalle St., Chicago, $6,299 and $8,957 respectively.

MONEL METAL CAP SCREWS—**Chicago, Ill.**—Dpt. P. Wks., City Hall, 6,000 monel metal cap screws, to Pipe Yard B, to Hodgson Fdry. Co., 2012 West 13th St., $1,500. Bids Nov. 20, awarded Dec. 5.

WATER PIPE—**Chicago, Ill.**—Dpt. P. Wks., City Hall, furnishing, delivering 328 tons 36 in. Class B, c.i. water pipe, to J. B. Clow & Sons, 201 North Talman Ave., $13,284. Bids Nov. 3, awarded Dec. 5.

LUMBER, etc.—**Council Bluffs, Ia.**—Pottawattamie Co., to Wheeler Bridge & Supply Co., Hubble Bldg., Des Moines, 762,400 ft. BM fir lumber, $32,610; 6,402 ft. BM white pine lumber, $288; 29,333 ft. BM treated southern pine lumber, $2,369; 28,125 ft. BM treated southern pine piling, $13,500 *** to Bernstein Bros. Co., Council Bluffs, 8,400 lin. ft. corrugated culvert pipe, $13,014. Grand total $61,781. Bids Dec. 3. Noted Nov. 27.

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†STEEL, etc.—**Springfield, Mass.**—Commanding Officer, Springfield Armory, 50,000 lb. heat treated hot rolled steel. Proposal 26, to Crucible Steel Co. of America, Springfield, 7.895c. per lb.***100,000 lb., to Republic Steel Corp., Massillon, O., 7.895c. per lb.***2,000 pcs. seamless steam tubing, Proposal 31, to Pittsburgh Steel Co., Union Trust Bldg., Pittsburgh, Pa., 37.49c. each. Bids Nov. 12.

†SPRUCE PLANK, etc.—**Watertown, Mass.**—Commanding Officer, Watertown Arsenal, 30,000 ft. spruce plank, to Blacker & Shepard Co., 409 Albany St., Boston, $1,033***20 tons roofing material, to U. S. Gypsum Co., 600 Chelsea St., Charlestown, $12.50 per ton***5,800 lin. ft. 1½ in. steel pipe, to Walworth Co., 28 Albany St., Boston, 11.29c. per ft.***17 tons pitch and 70 rolls asphalt paper felt, to Barrett Co., Beacham St., Everett, $15.60 per ton and $1.734 per roll respectively***4,000 pcs. roofing slate, to Ellide Co., 130 6th St., Cambridge***108 sheets copper and 34 sheets copper, to Chase Brass & Copper Co., Inc., 411 D St., Boston, 16.05c. and 18.45c. per lb. respectively.

CEDAR POLES—**Detroit, Mich.**—J. J. Gorman, comr. Purchases & Supplies, 66 cedar poles 45 ft. long, for Public Lighting Comn., Atwater St., to Westinghouse Electric Supply Co., 547 Harper Ave., at $16.75 each. Noted Nov. 15.

CAST IRON PIPE—**Gladstone, Mich.**—Municipality, 200 tons c.i. pipe, to U. S. Pipe & Fdry. Co., Burlington, N. J., and Webb-Crawford Bldg., Birmingham, Ala., to exceed $6,500.

LUMBER — **Minneapolis, Minn.** — Bd. Educ., City Hall, lumber, to Northwestern Hardwood Co., 1129 Lumber Exch. Bldg., $2,513***to Foote Lumber & Coal Co., 2528 University Ave. S.E., Minneapolis, $863***and to Thompson Lumber Co., 917 Washington Ave. S.E., $863. Grand total $4,239. Bids Nov. 21.

†ELECTRIC WELDING CABLE—**Vicksburg, Miss.**—U. S. Eng., Box 667, 500 ft. No. 2/0 rubber covered single conductor electric welding cable, to Paranite Wire & Cable Corp., Jonesboro, Ind., $155. Bids Nov. 30.

†STEEL PLATES—**Vicksburg, Miss.**—U. S. Eng., furnishing, delivering 44,477 lb. Class A steel plates, either sheared or Universal mill, to Illinois Steel Co., Brown Marx Bldg., Birmingham, Ala., $1,050. Bids Nov. 26.

WIRE ROPE, etc. — **North Carolina** — Div. Purchase & Contr., A. S. Brower, dir., furnishing 4 months' requirements wire rope, to New York Cordage & Cable Co., 162 South St., New York, $8,928***14 single spans for timber substructures, to Southern Eng. Co., Little Pittsburg, Charlotte, $1,927***1,000 road machine blades, to Beach Mfg. Co., Richmond, Va., $2,700***450 miscellaneous steel bars, to Textile Mill Supply Co., 1300 South Mint St., Charlotte, $640***1,300 drag blades, to Raleigh Tractor & Equipment Co., 108 West Lone St., Raleigh, $2,558***two hundred 100 lb. steel drums and three hundred 25 lb. tins and twenty-five 100 lb. pails pressure gun grease, to Sinclair Refining Co., 573 West Peachtree St., N. E., Atlanta, Ga., $1,203. Grand total $17,956. Bids Nov. 27.

†CONDENSERS, etc.—**Phila., Pa.**,—Yards & Docks, Navy Dpt., Wash., D. C., condenser and auxiliaries at Navy Yard, Spec. 7825, to Foster Wheeler Corp., 165 Bway., New York, N. Y., $32,816. Bids Nov. 21. Noted Nov. 15.

†RIP RAP STONE—**Memphis, Tenn.**—U. S. Eng., P. O. Box 97, 8,000 cu.yd. rip rap stone, f.o.b. contractors barges at points along Mississippi River between Cairo, Ill. and Memphis, Tenn., to Barrett Line Quarries, Inc., 1121 Chambers of Commerce Bldg., Cincinnati, O., $2.50 per cu.yd., total $20,000. Bids Nov. 26.

FOREIGN

Argentine—Standard Oil Co. of New Jersey, 26 Bway., New York, reconditioning burned Campana refinery (atomospheric and vacuum pipe still) separate contracts now being awarded. To exceed $500,000. Vacuum pipe, to Lummus Co., 50 Church St., New York. Soon lets contract boilers and other equipment. Private plans.

Argentina, Buenos Aires—Adolfo Lamvertine, Viamonte, 545 interested in prices of enameled copper wire for manufacture of radio coils, sizes, millimetres diameters .09, .10, .12, .14, .15, .16, .35 and 1.0 to be shipped in cardboard spools of about 2 kilos each. Perma-Title Mfg. Co., Minneapolis, Minn., reference.

Asia, Mongolia — Mongolian Government, Wiga, Mongolia, and Textile Machinery Trust, Moscow, c/o Amtorg Trading Corp., 261 5th Ave., New York, plan textile mills. To exceed $1,000,000.

Australia, Melbourne—Automobile Mfg. Co. (Datsum), c/o Mitsubishi Shoji Kaisha, Kobe and Tokyo, Japan, plans automobile assembly plant, for Datsum Automobiles. To exceed $500,000.

China, Shanghai—Duncan & Co., Hamilton House, 170 Kiangse Rd., interested in prices of blower and other ventilating equipment. Reference, U. S. Radiator Corp., custom duty 10%.

Dutch New Guinea—Corporation, c/o Standard Oil Co. of California, San Francisco, Cal., plans developing oil properties, incl. drilling wells, storage, etc. To exceed $500,000.

England—Bradshaw, Gass & Hope, 19 Silvewell St., Bolton, preparing plans municipal building in **Luton.** Intending bidders should register names with Town Clerk, W. H. Robinson, 19 King St., Luton, $500,000***Dewsbury Town Clerk takes bids in January, constructing 316 houses, $466,000***Jan. 8, by G. F. Strinz, clk. Metropolitan Water Bd., **London,** supplying and erecting 2 watertubes boilers, settling superheaters, economizer, etc. for supply and erecting of steam turbine with centrifugal pumps and electric generator***Madras & Southern Mahretta Railway Co. Ltd., 25 Buckingham Palace Rd., **London,** in market for materials 634 tons M.S. rounds, squares, angles, flats, 290 tons M.S. plates and sheets.

England, London—O. Murray & Co., Ltd., 70 Mark Lane, E.C. 3, interested in prices of chlorate of potash. Customs Duty, commercial grades 10%, refined grades 33-1/3%.

France, Paris—Ministry of Labor announced 1935 construction program for harbor works to extent 53,853,000 francs.

Honduras, Sula — Hammer Agencies, San Pedro, interested in prices of barbed wire 4 point 3 in. Iowa style, 12 gage on steel reels in 200 reel lots. Whitney Natl. Bank, C.A. Div., New Orleans, La., reference.

Italy — Azienda Generale Italiana Petroli, Rome, plans oil refinery, at undisclosed location. $500,000 or more***Standard Oil Co. of New Jersey, 26 Bway., New York, plans oil refinery, $300,000. Architect not appointed.

Japan—Steel Corp., c/o Mitsui & Co., Kobe, 68 in. three high steel rolling mill, with table, motors, controls, etc., to Lewis Fdry. & Machine Co., Pitsburgh, Pa.

Japan, Osaka—Nippon Senryo Slazo K.K., Osaka, plans repairing typhoon damage to dyestuffs plant. To exceed 700,000 yen.

Manchoukua — Manchoukuan Government, constructing 3 railways, to South Manchuria Railroad Co., $12,000,000.

Mexico, Matehaula — Kildun Mining Corp., Matehaula, c/o American Smelting & Refining Co., 120 Bway., New York, mining development, shaft work, tunnelling, etc., by day labor. To exceed $30,000.

Mexico, Zacatecas — Carnegie Metals Co., Pittsburgh, Pa., mining development and ore mill at El Bote Mine, day labor and separate contracts. $60,000.

Northern Ireland, Belfast—City Tuberculosis Committee, bids in December for Whiteabbey Sanitorium addition. $750,000.

Union Socialist Soviet Republics—Commissariat of Heavy Industry, Moscow, c/o Soviet Government or Amtorg Trading Corp., 261 5th Ave., New York, making plans experimental plant for commercial production of fuel oils from peat tar. To exceed $500,000. Leningrad Industrial Institute, Leningrad, engrs. and archts.

Union Socialist Soviet Republics — Dpt. Health, Soviet Government, Moscow, or c/o Amtorg Trading Corp., 261 5th Ave., New York, hospital by day labor. To exceed $1,000,000. **Maturity in 1935.**

Union Socialist Soviet Republics—Oil Trust, Soviet Government, Moscow, or c/o Amtorg Trading Corp., 261 5th Ave., New York, developing oil properties, drilling and transportation and storage, by day labor. $500,000.

Union Socialist Soviet Republics—Soviet Government, Moscow, or c/o Amtorg Trading Corp., 261 5th Ave., New York, constructing 50 kilometers granite embankment along Yauza and Moscow Rivers, by day labor. To exceed $500,000.

Union Socialist Soviet Republics — Soviet Government, Dpt. Public Health, or c/o Amtorg Trading Corp., 261 5th Ave., New York, hospital, at Kassan Sea, by day labor. **Maturity after Mar. 1.** To exceed $500,000.

Union Socialist Soviet Republics—Tea Trust, c/o Soviet Government, Moscow, or c/o Amtorg Trading Corp., 261 5th Ave., New York, 11 tea processing plants in Transcacasia and Georgia, by day labor. To exceed $1,000,000. **Maturity in 1935.**

†*Federal Government.*

DETAILS OF PWA NON-FEDERAL ALLOTMENTS

Loans and Grants Except as Noted.

***Grant. †Loan.**

KEY TO SYMBOLS

m-meters	c-canal
p-pump	dm-dam
t-tank or standpipe	r-reservoir
f-filtration	tr-treatment plant
d-distr. supt.	b-building
w-well	I-iron removal
s-supply	pw-power line
g-generator	sf-softening
ch-chlorinators	bl-boilers

Water Works

Apache, Okla., w-p-r-d	$17,000
Beardstown, Ill., i-d	72,000
Blossom Prairie, Tex., d-p-f-t-d	40,000
Corozal, Puerto Rico, s-f-d	50,000
Deepwater, Mo., w-t-d	60,000
Hardinsburg, Ky., d-p-f-t-d	56,000
Marion, Tex., w-p-t-d	44,000
*Monroe, N. J., w-p-t-d	8,500
St. George, Utah, s-r-d	132,000
Santaquin, Utah, s-d	30,000
Tigerton, Wisc., w-p-t-d	50,000

Sewage Disposal Plants

Spencer, N. Car.	35,000
*Camden Co., N. J.	29,000
Cape Charles, Va.	35,000
Claremont, N. H.	487,000

Street or Road Const.

*Fargo, N. Dak. (paving)	20,500
*Orangeville, Ill. (Concrete Paving)	4,700

Buildings

Charlottesville, Va. (hospital)	208,500
Randolph, Neb. (community house)	29,000
San Mateo Co., Calif. (court house	167,000
*Weymouth, Mass. (hospital)	60,000

Schools

Canyon, Tex. (cottages)	29,000
Canyon, Tex. (dormitory)	62,000
Canyon, Tex. (residence)	6,500
*Chauncey, Ohio	13,300
Grayson Co., Tex.	30,000
Hudson Co., N. J.	1,281,000
Little River, Tex. (gymnasium)	6,900
Melmore, Ohio	85,000
Sonoma Co., Calif.	45,600

PUBLIC BUILDINGS

PROPOSED WORK

Calif., Fresno—Fresno Co. plans by Allied Architects, 304 Rowell Bldg., completed for rein.-con. courthouse and Hall of Records, containing 2 elevators, steam heating plant and sprinkler system. $280,000. F. W. Kellberg, 544 Market St., San Francisco, structural engr. A. Coddington, 222 Kearney St., San Francisco, mechanical engr.

Calif., Fresno—Fresno Co. plans by Allied Architects, 304 Rowell Bldg., completed for municipal auditorium, steel frame with stage equipment, steam heating and sprinkler system. $375,000. F. W. Kellberg, 544 Market St., San Francisco, structural engr. A. Coddington, 222 Kearney St., San Francisco, mechanical engr.

†Calif., Huntington Park—Treas. Dpt. at office Sup. Archt., Wash., D. C., preparing plans and takes bids in December U. S. Post Office, Seville and Zoe Aves. $152,000. Noted Sept. 6.

Calif., Los Angeles — Harbor Comn., plans freight terminal, Berth 147. $150,000. United Fruit Co., C. S. Doswell, mgr., 1 Federal St., Boston, Mass., lessee. Noted May 31, under "Industrial Buildings."

Calif., Los Angeles—Los Angeles Co. Farm, W. A. Davidson, mechanical engr., Hall of Records, completed revised plans for new 2 infirmary units at county farm. $116,000.

Calif., Los Angeles—Bd. Educ. revised plans by Parkinson & Parkinson, 808 Title Insurance Bldg., 2 story, 60 unit, 64x208 ft. and 64x260 ft. rein.-con., Class A school, Buildings A and B Manual Arts High School, 4131 South Vermont Ave. Est. $318,000. E. L. Ellingwood, H. W. Hellman Bldg., engr.

Calif., Napa—City Council making surveys engaging engineer to make report on cost to acquire or construct municipal light and power plant.

†Federal Government.

Calif., Oakland—Alameda Co. plans Dormitories K and L at Fairmount (County) Hospital, Foothill Blvd. $150,000.

Calif., San Francisco—City and San Francisco Co., plans by G. Kelham, 315 Montgomery St., W. P. Day, Financial Center Bldg., and J. Bakewell, Jr., 251 Kearny St., approved by State Div. of Architecture for 3 story, rein.-con. academic building, incl. 28 classrooms, 15 special rooms, 2 choral rooms, steel frame gymnasium, 1,600 seating capacity auditorium, 6 rein.-con. shop units, Fillmore St. near Bay. $775,000.

Calif., South San Francisco—City, making surveys completed 4-unit diesel-operated electric power plant. Est. $360,000.

Conn., Ansonia—City plans new high school, incl. gymnasium, auditorium and classroom units, State and Johnson Sts. $275,000. Architect not appointed.

†Conn., Newington—Vet. Bu., Arlington Bldg., Wash., D. C., sketches brick, steel hospital. To exceed $150,000. D. W. Orr, 950 Chapel St., New Haven, archt.

†Ga., Atlanta—Federal Emergency Housing, c/o O. I. Freeman, proj. mgr., 101 Marietta Bldg., plans by Edwards & Saywards, 101 Marietta Bldg., University Housing, incl. 42 units, 1 and 2 story, basement, brick, tile, rein.-con. buildings, steam, gas, concrete floors, etc.

Ga., Atlanta—City, c/o J. Ley, mayor, City Hall, plans by J. R. Dillon & E. A. Lewis, archts. and engrs., Grant Bldg., remodeling auditorium, Gilmer St. $700,000.

Ind., Jasper—School Comrs., plans by H. E. Boyle, 405 Furniture Bldg., Evansville, steel high school addition. $115,000.

Ind., Terra Haute—School Comrs., made plans constructing Highland School, brick, steel. $110,000. J. T. Sankey, 417½ Ohio St., trustee.

Ia., Sheldon—Defeated proposal to establish, maintain and operate municipal light and power plant. $240,000. Will not build. Noted Nov. 15.

†Mass., Boston—First Naval Dist., Public Wks. Officer, Bldg. 39, Navy Yard, plans structural shop addition and shipways extension at Charleston Navy Yard. Est. $500,000.

†Mass., Boston—Public Works Officer, Building 39, Navy Yard, plans rebuilding 2 or more storage buildings at Charleston Navy Yard.

Mass., Hudson—Town, School Building Com., School Dpt., Town Hall, high school. Est. $105,000. Architect not appointed. Financing plan to be decided at March meeting when committee reports. Probably Federal aid project.

Mass., Uxbridge — Town, Dpt. Schools, sketches by T. J. Brodeur, 83 Gates St., Worcester, 2 story, basement, brick, steel high school or high school addition. $105,000.

Mich., Benton Harbor—City plans by D. Lakie, Grand Rapids, 4 story, rein.-con., brick, rein.-con. cold storage plant, plain found. $238,000. P.W.A. project.

Mo., Kansas City—Bd. Educ. plans by Wight & Wight, 300 1st Natl. Bank Bldg., school, Swope Parkway and Meyer Blvd. $600,000.

Mont., Anaconda — Galen State Tubercular Hospital, E. K. Vidal, supt., bids about Jan. 15, sanitarium. $215,000. P.W.A. project. Shanely, Willson & Hugenin, Great Falls, archts. P.W.A. project.

Mont., Butte—School Dist. 1, Silver Bow Co., bids about Jan. 2, 3 story, basement, 300x300 ft., brick high school. $800,000. P.W.A. project. Bird & Van Teylingen, Medical Arts Bldg., Great Falls, archts.

Mont., Kalispell—Flathead Co. School Dist. bids after Jan. 1, general contract remodeling and constructing high school additions, incl. classrooms, shops, auditorium, reconstructing present shop building into gymnasium and remodeling present building. P.W.A. project. F. A. Brinkman, Whipps Bldg., archt. Noted Nov. 15.

Mont., Missoula—Missoula School Bd., c/o L. M. Felton, secy., bids about Feb. 1, rebuilding Central Grade School, and remodeling Lowell School. P.W.A. project. H. E. Kirkemo, Missoula, archt. Noted Oct. 25.

Mo., Kansas City—Bd. Educ. plans by C. A. Smith, 800 Finance Bldg., 3 story, basement, brick, steel school. $125,000. P.W.A. project. N. W. Downes, 317 Finance Bldg., engr.

N. J., Kearny—Bd. Educ. plans by Guilbert & Betelle, 20 Branford Pl., Newark, school. $310,000.

†N. Y., Brooklyn—Treas. Dpt. at office Sup. Archt., Wash., D. C., bids in January or later constructing branch post office Station A, Deboise St. near Humboldt St. $130,000. Site selected.

†N. Y., Brooklyn—Treas. Dpt. at office Sup. Archt., Wash., D. C., soon takes bids Kensington Branch Post Office, McDonald St. near Church St. $92,000. Site selected.

†N. Y., Brooklyn—Treas. Dpt. at office Sup. Archt., Wash., D. C., soon takes bids branch Post Office "Y", 20th Ave. and 67th St. $120,000. Site selected.

N. Y., Canandaigua—City has retained L. C. Reynolds, 387 Castle St., Geneva, to make survey and report on establishment of municipal electric plant and system. Early surveys have indicated that the complete system will cost about $300,000, the final survey will probably change these figures somewhat. Noted Apr. 26.

†N. Y., Goshen—Treas. Dpt. at office Sup. Archt., Wash., D. C., soon takes bids 2 story, basement, brick, steel post office, plain found., $56,550. L. A. Simon, Wash., D. C., archt. E. P. Valkenburgh, 7 Linden Ave., Middletown, assoc. archt. Noted Mar. 16, 1933.

†N. Y., New York—Treas. Dpt. at office Sup. Archt., Wash., D. C., soon takes bids constructing Branch M postal station, East 165th St. east of Audubon Ave. $134,000. Site selected.

†N. Y., New York—Treas. Dpt. at office Sup. Archt., Wash., D. C., bids in January or later post office, Branch D, 11th St. and 4th Ave. $410,000. Site selected.

†N. Y., New York—Treas. Dpt. at office Sup. Archt., Wash., D. C., bids early in 1935, constructing (Fox Street Station) branch Post Office, Southern Blvd. near 167th St. $95,000. Site selected.

†N. Y., New York—Treas. Dpt. at office Sup. Archt., Wash., D. C., plans branch post office station "U", East 106th St. $146,000. Bids early in 1935.

†N. Y., New York—Treas. Dpt. at office Sup. Archt., Wash., D. C., bids in January, Post Office Branch Station H, 104th St. between Bway. and Amsterdam Ave. $318,000. Site selected.

†N. Y., New York—Treas. Dpt. at office Sup. Archt., Wash., D. C., soon takes bids Branch Post Office, Station W, 83rd St. between Columbus and Amsterdam Aves. $323,000. Site selected.

†N. Y., New York—Treas. Dpt. at office Sup. Archt., Wash., D. C., plans Washington Bridge Branch Post Office, 179th St. and Wadsworth Ave. $135,000. Site selected. Noted Sept. 13.

N. Y., Olean—Bd. Educ. plans by A. W. E. Schoenberg, Olean, for Senior high school. $800,000. P.W.A. project. P. B. Fleming, Rockefeller Bldg., Cleveland, O., mechanical engr. Noted July 5.

N. Y., St. George—Dpt. Health, Center St., New York, sketches by Sibley & Featherston, 205 East 42nd St., New York, 3 and 4 story health center, Central Ave. $150,000 or more. P.W.A. project.

†North Carolina—Dpt. Interior, J. E. Pinchon, mgr., Homestead Administration, plans homesteads on 5,000 acres land in Gaston and Cleveland Counties. $175,000.

†N. C., Elizabeth—Treas. Dpt. at office Sup. Archt., Wash., D. C., plans post office addition. Architect not appointed. $45,000.

†O., Cincinnati—U. S. Government, S. Rowe, chn., Muchmore Rd., plans by F. W. Garber & C. F. Cellarina, 616 Walnut St., rein.-con., brick multiple apartment building, Armory Ave. to Clark St. between Freeman and John Sts. $6,000,000.

†O., Cleveland—Treas. Dpt. at office Sup. Archt., Wash., D.C., bids early 1935, constructing Branch Post Office "A," Lorain Ave. and 65th St., $79,000; and Branch Post Office "H," 195th and Marlowe Ave. $92,000. Site selected.

O., Cleveland—Bd. Educ., M. Parker, dir. Schools, plans West High School addition, $315,000; Hough, Landon and Kinsman School additions $90,000; Jane Addams School (shop addition) $60,000. Private plans.

O., Hiram—Hiram College, K. I. Brown, pres., plans by J. W. Everhard, 9219 Clifton Blvd., Cleveland, 3 story, basement, brick, steel administration building, gymnasium and swimming pool, plain found., $250,000. Noted Nov. 29.

O., Minford—Bd. Educ. bids after Jan. 1, school. $125,000. De Voss & Donaldson, Portsmouth, archt.

O., Pierpont—Pierpont School Dist., W. O. Weir, superv., plans brick, steel central school, FERA project. $110,000. **Maturity early in 1935.**

O., Wapakoneta—City, Director Public Affairs, making plans constructing electric plant. $146,000. P.W.A. project. Frayne Combs, Wapakoneta, engr. Noted Nov. 15.

Pa., Darby—School Bd. plans by MacKenzie & Blew, Otis Bldg., Phila., plans additions to Senior High School, 7th and Spruce Sts. $250,000. Pending legislation.

Pa., Mayview—City plans by R. Neff, City County Bldg., Pittsburgh, (1st unit) 4 temporary steel buildings at City Home and Hospital. $100,000. Total est: $547,000.

Pa., Phillipsburg—Bd. Educ. plans Junior High School. To exceed $100,000. Architect not appointed. **Maturity 1935.** Financing not worked out yet.

†Pa., Phila.—Treas. Dpt. at office Sup. Archt., Wash., D. C., plans 1 story, 215x245 ft. post office, (North Phila. Station) 16th and Huntingdon Sts. $620,000.

Pa., Warren—City retained P. W. Elwell, engr., 5005 Euclid Ave., Cleveland, O., to prepare survey for light plant. Noted Sept. 20.

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Public Buildings (Continued)

R. I., Pawtucket—Municipality, A. Lamarre, comr. P. Wks., in charge, plans electric power plant, Pleasant St. To exceed $40,000. **Maturity indefinite.**

R. I., Providence—Rhode Island School for Deaf, 520 Hope St., plans sprinkler system at Rhode Island School for Deaf, $15,000. Grinnell Co., Inc., 260 West Exchange St., engrs.

Tex., Port Lavaca—City submitted plans to P.W.A. State Bd. for refrigeration unit, cold storage plant, oyster and shrimp storage facilities, diesel power plant, etc., incl. complete machinery equipping, $150,000, P.W.A. project. Garret Eng. Co., Port Lavaca and 300 Hughes St., Houston, engrs.

Va., Charlottesville—University of Virginia plans constructing pavilion addition to University Hospital, $208,500 P.W.A. loan and grant.

†Wis., Milwaukee—United States Naval Reserve, c/o H. C. Hengels, archt., 759 North Milwaukee Ave., plans 2 story, mezzzanine, 160x250 ft. naval reserve building, $550,000. Request for donation of site made to Park Bd. will come up before Common Council, Public Buildings & Grounds Committee on Dec. 3.

B. C., Victoria — Dominion Govt., Ottawa, Ont., plans 4 or 5 story, 50x140 ft., marine office building, Wharf St. $400,000. Architect and engineer not appointed.

Hawaii, Honolulu — University of Hawaii, Honolulu, plans agriculture building, also library addition, college campus. $167,000.

BIDS ASKED

Ark., Jonesboro—Arkansas State College, bids about Dec. 15, for first units of stadium, training school, engineering building to contain power plant. $450,000. A. W. McAninch, Little Rock, archt.

†Calif., El Monte—Dec. 28, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office.

Calif., San Francisco—Dec. 26, by S. J. Hester, secy. Dpt. P. Wks., 2 story, basement, school, 30th Ave. near Lawton St., general contract $220,000, mechanical equipment and plumbing $29,000, electrical work $12,000.

†D. C., Wash.—Jan. 3, by Treas. Dpt. at office Sup. Archt., Wash., D. C., air conditioning, refrigeration, etc., at U. S. Dpt. Agriculture Extension Building.

†Fla., Quincy—Dec. 19, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. Noted June 15.

†Ill., Jacksonville—Jan. 10, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office.

†Ill., Pittsfield—Dec. 18, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office.

Indiana—Dec. 18, by State Hy. Comn., Indianapolis, constructing sub-district service and garage, oil house, well house, storage building, at Veedersburg; 2 service buildings for Maintenance Dpt. at LaPorte; 2 service buildings at Plymouth; service building at Valparaiso; service building at Monticello; sub-district and service garage oil house and storage building at Aurora. J. D. Adams, chn.

†Ind., Columbia City—Dec. 27, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. Noted Sept 13.

Ind., Indianapolis—Flower Mission Memorial Hospital, bids about Jan. 1, general contract 3 story, 60x200 ft., steel hospital, at City Hospital Grounds, West 10th St. $120,000. Kopf & Deercy, 620 Pythian Bldg., archts.

†Ind., Nappanee—Dec. 19, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. Noted Sept. 13.

†Ky., Princeton—Dec. 21, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office.

Md., Glendale—Dec. 21, by District Comrs., District Bldg., Wash., D. C., constructing sanitorium and nurses home addition, at Children's Tuberculosis Sanitorium. $400,000.

Massachusetts—Dec. 19, by Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, furnishing electric lighting fixtures and lamps for State Hospital Building at Worcester, P.W.A. Project M-20, Docket 6243; same for 3 officers' cottages at Boston State Hospital, Dorchester, P.W.A. Project M-6, Docket 2065; for service building at State Hospital in Belchertown, P.W.A. Project M-40, Docket 1806.

Mass., Auburn—Town, H. Sibley, chn. Building Com., taking bids 2 story, basement, 50x160 ft., brick, steel high school, $250,000. P.W.A. project. L. W. Briggs, 314 Main St., Worcester, archt.

Mass., Waltham—Dec. 18, by Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, heating and ventilating for medical and surgical building at State Hospital. To exceed $25,000. P.W.A. project. Albert B. Franklin, Inc., 38 Chauncy St., Boston, engrs. Noted July 24.

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†Nrb., Grand Island—Jan. 2, by Treas. Dpt. at office Sup. Archt., Wash., D. C., extending and remodeling U. S. Post Office and Court House. Noted Oct. 25.

†N. J., Cape May—See "Contracts Awarded."

†N. Y., Brooklyn—Yards & Docks, Navy Dpt., Wash., D. C., taking bids repairing electric freight elevator at Navy Yard, Spec. 7839.

N. Y., New York—Dec. 21, by W. C. Martin, archt. and supt. School Buildings, Flatbush Ave. extension and Concord St., Brooklyn, general contract addition P.S. 80, East Mosholu Parkway North and East Van Courtland Ave., Bd. Educ., 500 Park Ave.

†N. Y., Oswego—Jan. 9, by Treas. Dpt. at office Sup. Archt., Wash., D. C., extending and remodeling U. S. Post Office. Noted Nov. 29.

†Pa., Phila.—Dec. 26, by Treas. Dpt. at office Sup. Archt., Wash., D. C., changes for treasury department laboratory in U. S. Custom House and Appraiser's Stores.

†R. I., Block Island—Dec. 20, by U. S. Coast Guard, Headquarters, Customs House, Boston, 2 story, 30x45 ft. dwelling and 1 story, 44x58 ft. boat house, launchway, all timber with concrete founds. $35,000.

†Tex., Baytown—Jan. 9, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office.

†Tex., Childress—Jan. 10, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. Noted Feb. 15.

†Tex., Dallas—Jan. 17, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing (except elevators) U. S. Parcel Post Building. Noted Sept. 13.

†Tex., Pecos—Jan. 14, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing (except elevator) U. S. Post Office and Court House. Noted Oct. 4.

†Wis., Ladysmith—Jan. 8, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office.

Ont., Toronto—Dpt. P. Wks., Ottawa, bids about Jan. 1, post office, Dundas and Keele Sts. $105,000. Craig & Madill, 96 Bloor St. W., archts.

CONTRACTS AWARDED

†Calif., Eureka—Yards & Docks, Navy Dpt., Wash., D. C., repairing and altering Naval Direction Finder Station, Point George, to T. Johanna, 2020 15th St., San Francisco, $2,825.

Calif., Los Angeles—Bd. Educ., reconstructing, rehabilitating and strengthening east building and central portion of Bridge St. School, to R. E. Campbell, 711 Central Bldg., $66,680, awarded Nov. 22***main building of Dominguez School, at Jackson, to Johnson, Hansen & Izer, 1433 Locust St., Long Beach, $23,972, awarded Nov. 26***main building less 1929 wings at Fishburn Ave. School, to Johnson & Dahlquist, 654 East 81st St., $30,370, awarded Nov. 22. Grand total $121,022. **P.W.A.**

Calif., Los Angeles—Bd. Educ., erecting new 24 unit administration building at David Starr Jordan High School, to Easton & Nesser, 4822 West Jefferson Blvd., $132,180. **P.W.A.** Awarded Nov. 26. Noted Nov. 30 Daily.

†Calif., Santa Clara—K. E. Parker, general contractor, 135 South Park, San Francisco, electrical work for U. S. Post Office, to R. Butcher, 1020 Sherwood St., San Jose, for Treas. Dpt. at office Sup. Archt., Wash., D. C. Noted Nov. 22, under "Contracts Awarded."

D. C., Wash.—District Comrs., District Bldg., constructing Georgetown Branch Library, to Bahen & Wright, 916 Rhode Island Ave. N.E., $138,206. Bids Nov. 27. Noted Nov. 15.

†Ill., Gillespie—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to J. Devault, Canton, O., $35,124. Bids Nov. 22. Noted Nov. 15.

†Ill., Moline — Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to Lundoff Bicknell Co., 100 North Salle St., Chicago, $152,115. Bids Nov. 20. Noted Nov. 1.

†Ill., Vandalia — Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to J. Devault, Canton, O., $37,250. Bids Nov. 26. Noted Nov. 15.

†Ia., Des Moines—Treas. Dpt. at office Sup. Archt., Wash., D. C., extending and remodeling U. S. Post Office, to Hanson Bros. Co., 127 North Dearborn St., Chicago, Ill., $344,990. Bids Nov. 15.

†Me., Bangor — Treas. Dpt. at office Sup. Archt., Wash., D. C., elevators in U. S. Post Office, to Otis Elevator Co., 139 Clarendon St., Boston, Mass., $4,711. Bids Oct. 22. Noted Oct. 18.

†Me., Houlton—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office and Court House, to Ross & Reid Stone Setting Co., 907 South Capitol St., Wash., D. C., $73,518. Bids Nov. 26. Noted Nov. 15.

Mass., Bourne—Town, School Com., plumbing and heating for 2 story, 55x60 ft., and [illegible] 110 ft., brick, steel high school, Cotuit St., to Boyden & Co., 14 Brattle Sq., Boston, $20,1[illegible]***electrical work, to F. I. S. Co., Buzzards Bay, $3,673. **P.W.A.**

Mass., Milford—Town, A. B. Cenedella, chn. School Com., general contract, 3 and 1 story, basement, 137x72x150 ft., high school addition, to R. H. Sewell & Co., A. J. Cataldo Bldg., Franklin, $192,685***heating, to Power Heating & Ventilating Co., 263 Harrison Ave., Boston, $30,504***plumbing, to J. G. Lamotte & Son, Inc., 21 Waldo St., Worcester, $8,9[illegible] Grand total $232,179. **P.W.A.** Bids Nov. 2[illegible] awarded Dec. 5. Noted Nov. 22.

Mass., Sterling—Town, Bd. Selectmen, Town Hall, electrical work for 2 story, basement brick, steel high school, Princeton Rd., to A. [illegible] Senecal Co., Westboro***reinforcing steel, to Kalman Steel, 75 Federal St., Boston***heating, to J. H. Lamotte & Son, Inc., 21 Waldo St., Worcester***plumbing, to John J. McGrath, 9[illegible] Foster St., Worcester***structural steel, iron, to Worcester Iron Wks., 136 Green St. **P.W.A.** Noted Nov. 22, under "Contracts Awarded."

†Miss., Meridian — Subsistence Homesteads Dpt. Interior, Wash., D. C., constructing 25 houses and outhouses for general subsistence homesteads, to Hoggson Bros., 485 5th Ave., New York, $44,300. Noted Oct. 25.

†N. H., Newport—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to Swanburg Constr. Co., 61 Amherst St., Manchester, $38,000. Bids Nov. 22. Noted Nov. 1.

†N. J., Cape May—Yards & Docks, Navy Dpt., Wash., D. C., demolition of Building 131 at Naval Air Station, Spec. 7807, day labor.

†N. Y., Ballston Spa—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to B. Z. Constr. Co., 1123 Bway., New York, $38,048. Bids Nov. 30. Noted Nov. 15.

N. Y., Elmira—W. H. Welliver, general contractor, 812 West 1st St., structural steel for Thomas Beecher School, to American Bridge Co., Elmira, for Bd. Educ. Total est. $125,000. Noted Oct. 25, under "Contracts Awarded."

†N. Y., Ithaca—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to F. R. Comb, 2113 Chicago Ave., Minneapolis, Minn., $13,887. Bids Nov. 14. Noted Oct. 25.

N. Y., New York—Dpt. Health, 139 Center St., general contract laboratory at Willard Parker Hospital, to Edward Corning Co., 204 East 39th St., New York, $343,433; heating, to H. Starkman & Bros., 132 Brook Ave., $70,800. **P.W.A.** Bids Oct. 30. Noted Oct. 18.

†N. Y., New York—Treas. Dpt. at office Sup. Archt., Wash., D. C., carving on sculptural panel at post office annex, to Edward Ardeline, 286 5th Ave., $6,468.

N. Y., Interlaken—Central School Bd., Interlaken, general contract 2 story, basement, brick, steel central school, to Swarthout & Rowley Co., Mount Hope Ave., Rochester, $149,000. Bids Nov. 22, awarded Dec. 3. Noted Oct. 25.

†N. C., Shelby—Treas. Dpt. at office Sup. Archt., Wash., D. C., extending and remodeling U. S. Post Office, to Morrison Falls Co., Shelby, $34,441. Bids Nov. 26. Noted Nov. 8.

†O., Barnsville—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to Gibbons-Grable Co., 214 DeWalt St., Canton, O., $33,310. Bids Nov. 23. Noted Nov. 22.

†Oregon—U. S. Eng., Portland, auditorium and civic building at Bonneville Dam, to A. S. Hansen Co., 2200 25th St., Seattle, Wash., $52,500. Bids Nov. 23. Noted Nov. 15.

†Pa., Doylestown—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to Hood & Gross, 1535 Chestnut St., Phila., Pa., $36,447. Bids Nov. 26. Noted Nov. 15.

R. I., Providence—State, chn. Building Comn., State House, general contract 3 story, basement, 54x144 ft., state office building addition, to O. D. Purington Co., Inc., 49 Westminster St., $136,392***plumbing, to Thos. R. Douglas, 8 Slocum St., $5,900***heating, to Frank Dupuis Co., 599 Main St., Pawtucket, $4,099***electrical work, to Hughes Electric Co., 495 Broad St., $5,892. Grand total $152,283. **P.W.A.** Bids Nov. 24, awarded Dec. 3.

Tex., Fort Worth—Bd. Educ., c/o E. P. Williams, bus. mgr., 409 East Weatherford St., general contract elementary school, consisting of classrooms, library, offices and cafeteria, Oakhurst Elementary School, to Quisle & Andrews, 2212 West 7th St., $106,945***heating, to D. Vickers, 411 South Jennings St., $9,678***plumbing, to Young & Pratt, Barton Springs Rd., Austin, $8,066***electric wiring, to State Electric Co., 1107 Vaughn St., $6,181. Grand total $130,870. **P.W.A.** Bids Nov. 13.

†*Federal Government.*

Public Buildings (Continued)

Tex., Fort Worth—Bd. Educ., c/o E. P. Williams, bus. mgr., 409 East Weatherford St., general contract Morningside Elementary School, 2 story, basement, 145x175 ft., brick, steel, rein.-con., to J. M. Gurley & Son, 1st. Natl. Bank Bldg., $91,370***heating, to Schmidt Plumbing Co., 209 West 11th St., $6,178***plumbing, to Wallace Plumbing Co., 2224 Summer St., Dallas, $9,625***electric wiring, to Goolsby Electric Co., 1111 Cherry St., $4,613. Grand total $111,786. **P.W.A.** Bids Nov. 13. Noted Nov. 1.

†**Okla., Claremore**—Treas. Dpt. at office Sup. Archt., Wash., D. C., general contract post office, to H. W. Underhill, 235 North Waco St., Wichita, Kan., $35,700. Bids Nov. 26, awarded Nov. 27. Noted Nov. 1.

Ont., Orillia—Orillia Water, Light & Power Comn., F. H. Horne, chn., 110 Mississaga St., E., 2 single runner vertical turbines for hydro-electric power development, on Gull River, to S. Morgan Smith-Inglis Co. Ltd., 14 Strachan Ave., Toronto***60 in. valve to Jenkins Bros. Ltd., 617 St. Remi St., Montreal, Que.***sluice pipe fittings, to E. Long Ltd., Orillia***pole line hardware awarded to 9 firms. Bids Dec. 3. Noted Nov. 22, under "Waterworks."

COMMERCIAL BUILDINGS

PROPOSED WORK

Calif., Burbank—Warner Bros., 321 West 41st St., New York, and Burbank, plans repairing fire damaged studio, incl. storage building, carpenter, tin, plumbing and machine shops, $300,000 loss. Private plans.

Calif., Oakland—Mills College plans by W. H. Ratcliff, Chamber of Commerce Bldg., Berkeley, plans fireproof dormitory, College Campus, $120,000.

Calif., San Mateo—San Mateo Studios, Inc., represented by S. A. Hedding, Hotel Whitcomb, San Francisco, plans studios, on 9 acre site, incl. soundproof studio buildings, stages, dressing rooms, executive buildings, storage quarters, etc.

Conn., Hartford—Owner, sketches by L. B. Scheide, 36 Pearl St., Hartford, 6 story, brick, steel office building, Trumbull and Pearl Sts. $105,000 or more.

Me., Lewiston—St. Joseph's Parish, J. F. Nilligan, pastor, parochial school, Bates St. To exceed $105,000. Project abandoned for the present. E. T. P. Graham, Inc., 171 Newbury St., Boston, archt. Noted Sept. 27.

Mass., Brookline—Owner, c/o H. Ramsey, 184 Boylston St., Boston, plans by H. Ramsey, 184 Boylston St., Boston, 35 single houses and constructing streets fronting same, off South St., as residential development. To exceed $150,000. R. T. Hart, 23 King St., Belmont, engr.

Mass., Quincy—Dennison Airport Kennel Club, c/o H. T. Dennison, archt., Carle Rd., plans brick, steel clubhouse, grandstand, kennels, race tracks and various smaller buildings at Dennison Airport. $220,000 or more.

N. H., Franconia—E. J. McKenzie, sketches by G. C. Glover, 89 State St., hotel. **Maturity in Spring.**

N. J., Madison—E. P. Hamilton & Co., 49 Bway., New York, and 16 Lackawanna Plaza, Orange, plans developing 50 acre tract, incl. 30 or more dwellings, Woodland Rd. and Prospect St. $100,000 or more. **Maturity after Mar. 1.** F. Pring, 367 Ravine Dr., South Orange, in charge of construction.

N. Y., Brooklyn—B. Hoegemann, c/o F. Savignan, archt., 6005 14th Ave., plans altering heating, plumbing in 5 story apartment, Washington and DeKalb Aves. $30,000.

N. Y., Brooklyn — Carlton Amusement Co., 1201 Quentin Rd., or c/o J. J. Klein, 37 West 47th St., New York, plans motion picture theatre, 1201 Quentin Rd. To exceed $100,000.

N. Y., Brooklyn—Godoff Co., 1350 Bway., New York, plans by H. B. Rutkins, 1860 Bway., New York, 6 story, brick apartment, 4902 17th Ave. $190,000.

N. Y., New York—Corporation, c/o McMorrow Bros., 151 East 45th St., plans altering heating and plumbing for 7 story apartment, 126 Riverside Dr. $28,000 or more.

N. Y., New York—Crestview Apartments, Inc., 130 Fort Washington Ave., plans by H. Ginsbern, 205 East 42nd St., 15x125 ft., brick, steel store and apartment, plain found., 176th St. and Morris Ave. $250,000.

N. C., High Point—Mrs. H. R. B. Broadhurst, High Point, plans 30x40 ft. store; High Point Enterprise Co. plans 47x140 ft. store; C. L. Amos plans 36x140 ft. store; R. 3. Gantt plans 31x140 ft. store; G. Steffans plans 20x 140 ft. store, all to be 2 story, basement, Indiana limestone, etc., on Jones property, North Main St. To exceed $100,000. T. T. Ferree, archt., High Point., preparing final plans for above projects.

N. Y., New York—Three Hundred Thirty-Seven East 37th Street Corp., 20 Exchange Pl., bids late in December from selected list bidders, boiler room, heating alterations on apartment, 337 East 37th St. To exceed $28,000. Acook & Lloyd, 13 East 37th St., archts. Noted Nov. 29.

N. Y., New York—Van Dyck Amusement Corp., A. B. Bashein Co., 4752 Bway., New York, plans stores and theaters, Bway. and Dyckman St. $100,000 or more. Site selected.

N. Y., St. Albans—Aladdin Homes, 222nd St. and 115th Ave., plans constructing group 100 dwellings, 222nd St. and 115th Ave. To exceed $105,000. **Maturity later.**

O., Cincinnati—Ninth St. Baptist Church, 21 West 9th St., bids late in December, 2 story, basement, church and memorial building, 9th St. To exceed $100,000. G. Drach, and Fosdick & Hilmer, Union Trust Bldg., archts. Noted Oct. 11.

Pa., St. Marys—Bd. Trustees, A. Kaul Memorial Hospital, C. Harvey, chn., plans brick, steel hospital to replace structure destroyed by fire. To exceed $105,000. $150,000-$200,000 fire loss. **Maturity early in 1935.** Architect not appointed.

Tenn., Cleveland—Church of God, S. W. Latimer, genl. overseer, Cleveland, plans brick, concrete, steel dormitory, for use by Bible School, Montgomery Ave. Architect not appointed.

Tex., Amarillo—R. C. Arnold, archt., c/o Hamilton Bldg., Wichita Falls, soon lets contract 1 and 2 story, 123x270 ft., semi-fireproof auto court apartment building, 31 apartments, 29 parking garages, showers, tile baths, laundry equipment, kitchen units, electric water pump, for R. L. Curren, c/o architect.

Tex., Mission—Owner, c/o J. Finger, archt., National Standard Bldg., Houston, archt., plans completed 8 story, brick hotel, incl. dining room, coffee shop, arcade, 4 store spaces, air cooling system. $300,000. W. E. Nelson, Brownsville, asst. archt.

Tex., Wichita Falls—J. C. Penney Co., 330 West 34th St., New York, plans department store, storage and distribution building to replace burned buildings. To exceed $100,000.

Wis., Milwaukee — Plankington Trust Co., West Wisconsin St., plans by Kirchoff & Rose, 710 North Plankington Ave., 1 story, basement, 105x200 ft., tile or Bedford stone store, West Wisconsin Ave. $300,000. J. C. Penny Co., lessee.

Ont., Galt—Gore Dist. Fire Insurance Co. making plans and takes bids in spring office building. $150,000.

Ont., North Bay—North Bay Rink & Auditorium Co., Dr. D. A. Campbell, pres., 196 Main St. W., plans 1 story, 150x264 ft. steel, brick rink and auditorium, McIntyre St. Interested in prices of everything.

Que., Verdun—Roman Catholic School voted $345,000 for new school. 1935 construction.

BIDS ASKED

Ala., Birmingham—Loveman, Joseph & Loeb, 3rd Ave. and 19th St., soon lets contract, department store. $500,000. W. E. Lehman, 972 Broad St., Newark, N. J., archt. Noted Nov. 15.

Calif., Hollywood—S. C. Lee, archt., 2404 West 7th St., Los Angeles, taking bids general contract theatre, 900 persons capacity, 6673 Hollywood Blvd., for H. Sheehan, c/o architect. To exceed $100,000.

N. J., Teaneck—See "Contracts Awarded."

N. Y., Brooklyn—See "Contracts Awarded."

N. Y., Flushing—See "Contracts Awarded."

N. Y., New York—See "Contracts Awarded."

N. Y., St. Albans—See "Contracts Awarded."

CONTRACTS AWARDED

N. J., Teaneck—Glen Orchard Inc., River Rd. and Highway 4, constructing group 20 or more dwellings, River Rd. and Highway 4, separate contracts. To exceed $100,000.

N. Y., Bayside—Recovery Realty Co., 198-11 32nd Ave., group dwellings, 206th St. and 34th Ave., day labor and separate contracts, $100,000. A. Allen, Garden City, archt. Noted Nov. 29.

N. Y., Binghamton—P. Pavia, general contractor, 17 Emerson Pl., structural steel for Our Lady of Lourdes Memorial Hospital, to Leach Steel Corp., Steel St., Rochester, for Our Lady of Lourdes Memorial Hospital, Riverside Dr. Est. $160,000. Noted Nov. 15, under "Contracts Awarded."

N. Y., Brooklyn—Bway Savings Bank, 5 Park Pl., New York, altering plumbing and heating in 5 story apartment, State St. near Bond St., to Tarney Constr. Co., 375 State St. Est. $28,000. Noted Nov. 1.

N. Y., Brooklyn—A. D. Exposito, 1428 East 17th St., constructing group dwellings, Surf Ave. and Beach 38th St., separate contracts. To exceed $100,000. Seelig & Finkelstein, 153 Pierrepont St., archts. Noted Nov. 29.

N. Y., Brooklyn—A. Feingold, 1020 East 14th St., 6 story, 90x120 ft., brick, steel apartment, Avenue L and East 19th St., separate contracts. $150,000. Seelig & Finkelstein, 153 Pierrepont St., archts. Noted Nov. 29.

N. Y., Brooklyn—Ferrante Corp., 431 Albany Ave., ten or more 2 story, 26x56 ft. dwellings with garages, East 57th St. and Church Ave., separate contracts. To exceed $100,000. Owner now taking bids. Kallich & Weinstein, 375 Fulton St., archts. Noted Nov. 29.

N. Y., Brooklyn—Hamburg Savings Bank, 1451 Myrtle Ave., altering heating and plumbing in apartment, Putnam Ave. and Bway., to A. Zink Sons, 32 Dodworth St. Est. $28,000. Noted Nov. 29.

N. Y., Brooklyn—Highway Gardens, Inc., 26 Court St., 6 story, brick apartment, plain found., Kings Hy. and 23rd St., separate contracts. $300,000. M. N. Weinstein, 93 Court St., archt. Noted Nov. 29.

N. Y., Brooklyn—Robertson-Gaetz Corp., 311 Marine Ave., 6 story, 40x80 ft., brick, steel apartment, plain found., Marine and 3rd Aves., separate contracts. $150,000. J. Gabatchnick, 1838 West 5th St., archt. Noted Nov. 29.

N. Y., Brooklyn—Williamsburg Savings Bank, 175 Bway., altering heating in apartment, Greenpoint and Manhattan Aves., separate contracts. To exceed $28,000. I. Prowler, 367 Fulton St., archt. Noted Nov. 8.

N. Y., Flushing—Sunlind Homes, 1684 Carroll St., Brooklyn, group of dwellings, 146th St. and 58th Rd., separate contracts. To exceed $100,000. A. Allen, Garden City, archt. Noted Sept. 20.

N. Y., New York—Big Seal Realty Corp., 235 East Mount Eden Ave., altering heating in 4 story, apartment, Tinton and Westchester Aves., separate contracts awarded. $28,000. Sampson & Levy, 341 East 149th St., archts. Noted Nov. 27.

N. Y., New York—Solen Realty Corp., 555 West 42nd St., altering heating and new incinerator in apartment, 411 East 88th St., separate contracts and day labor. To exceed $28,000. L. and L. Levy, 527 5th Ave., archt. Noted Nov. 29.

N. Y., New York—P. Hyman, 152 Lincoln Blvd., Merrick, altering heating and plumbing in four 3 and 5 story apartments, 600 East 14th St., separate contracts. $40,000. B. Sylan, 15 Nassau St., archt. Noted Nov. 29.

N. Y., New York—Murwin Realty Corp., N. A. Winters, pres., 350 Madison Ave., altering heating and plumbing in 12 story apartment, 68 East 86th St., day labor and separate contracts. To exceed $28,000. Noted Nov. 29.

N. Y., St. Albans—Stafford Associates, 6786 Selfridge St., Forest Hills, constructing group 15 or more dwellings, 22nd St. and 115th Rd., day labor and separate contracts. To exceed $100,000. Noted Nov. 29.

N. Y., Springfield — Frankson Realty Co., 140-68 172nd St., group 12 or more dwellings, 145th Ave. and 174th St., separate contracts now being awarded. $100,000 or more. L. Danancher, 147-25 Jamaica Ave., Jamaica, archt. Noted Nov. 29.

O., Bexley (mail Columbus)—Columbus Theatre Corp., c/o E. W. Austin, archt., 17 South High St., theatre, Main St., Bexley, to E. J. Scarlett, 2485 Bexley Park Rd. Est. exceeds $100,000.

INDUSTRIAL BUILDINGS

PROPOSED WORK

Ala., Birmingham — PLANT, etc. — Hill & Griffith Co., 2931 7th Ave. N., plans repairing fire damaged plant and foundry, 30th St. and 6th Ave. To exceed $30,000. Architect not appointed. Loss exceeds $100,000.

California—GOLD MINING DEVELOPMENT—Morning Star Gold Mines, Ltd., c/o A. Rossi, 2229 P St., Sacramento, plans development gold mining properties at various locations. To exceed $30,000.

California—MINING DEVELOPMENT—O. E. Chaney, Reno, Nev., plans developing mining properties, incl. construction of canals and flumes to divert water to properties. To exceed $40,000.

California—MINING DEVELOPMENT—H. H. Taylor, Russ Bldg., San Francisco, plans mining development, incl. placer operations and diversion of water from Middle Yuba River. $127,000.

Calif., Happy Camp (Siskiyou County)—HYDRO-ELECTRIC PLANT — Happy Camp Property Owners Assn., Happy Camp, plans small hydro-electric plant. To exceed $20,000.

Calif., Sacramento — BOTTLING PLANT — Golden State Soda Wks., 1715 15th St., plans bottling plant on 100x160 ft. site, 11th and Q Sts.

Conn., Hartford—SERVICE STATION—Connecticut Refining Co., West Haven, plans 1 story, 25x40 ft. service station, incl. three 20-000 gal. and three 1,000 gal. steel tanks. H. S. Cannici, 865 Chapel St., New Haven, engr.

Conn., West Hartford (br. Hartford)—BUSINESS—A. C. Peterson Dairy, 246 Park Rd., postponed until spring construction of 2 story, 62x120 ft., brick, steel, limestone business, incl. dairy quarters and garage, Park Rd. $60,-000. W. T. Marchant, 36 Pearl St., Hartford, archt. Noted Nov. 1.

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†*Federal Government.*

Industrial Buildings (Continued)

Ga., Atlanta—PLANT—International Harvester Co. of America, Chicago, Ill., and 122 East 42nd St., New York, bids in January or later, plant addition. $45,000.

Idaho, Twin Falls—MINING PROPERTIES—Interstate Mining Corp., T. O. Boyd, pres., plans developing mining properties, incl. tunnel work, shop, dwellings and other structures, in vicinity of here. $350,000.

Ill., Chicago—PLANT—Rock-Ola Mfg. Co., 625 West Jackson Bldg., plans reconditioning Gulbransen Piano plant for vending machine manufacturing, 816 North Kedzie St. $30,000 or more.

Ind., Gary — SUPER SERVICE STATION — Templin & Snyder, Gary, making plans super-service station, 6th and Adams Sts. $90,000.

Ind., Winamac—SERVICE STATION—State Hy. Comn., Indianapolis, making plans service station and garage. Site purchased. J. D. Adams, chn.

Mass., Ayer —WAREHOUSE, etc.— Neshoba Cold Storage Co., H. P. Gilmore, Westboro, plans completed by F. J. Sill, East Main St., Westboro, 3 story, 70x125 ft., concrete cold storage plant and warehouse. $75,000. No action until spring. Noted Oct. 11.

Miss., Hattiesburg—MILL—Corporation, c/o Hattiesburg Chamber of Commerce, plans silk weaving mill. $35,000 exclusive of equipment. Domestic Silk, Inc., 463 7th Ave., New York, lessee. Owner will construct for lessee which will occupy plant to be constructed, rent free (5 years) in return for establishing plant there.

Mont., Basin—MINE DEVELOPMENT—Basin Gold & Silver Mining Co., plans developing mining properties. $200,000, incl. equipment purchases.

Neb., Omaha—DRY CLEANING PLANT—Kimball Laundry & Zoric Dry Cleaners, 1504 Jones St., will award contract brick top addition, incl. refrigeration system, without competition. $42,000. J. Latenser Sr., Insurance Bldg., archt. Noted Oct. 4.

Neb., Omaha—GRAIN ELEVATOR—Cargill Commission Co., Grain Exch. Bldg., plans repairing building and replacing elevator machinery in grain elevator, 76th and Farnam Sts. $300,000.

Nev., Tonopah—MINING DEVELOPMENT—General Metals Recovery Corp., A. Silver, mgr., Tonopah, plans slime plant. $85,000.

N. J., Paulsboro—FACTORY—Paulsboro Shirt Co. plans plant. To exceed $28,000. Architect not appointed.

N. Y., Buffalo—GASOLINE SERVICE STATIONS—Elk Filling Corp., Hotel Statler, plans constructing group gasoline stations throughout city. $28,500 or more. **Maturity in 1935.**

N. Y., Long Island City—PLANT—Bloch & Guggenheimer, 327 East 103rd St., New York, plans altering bronze plant into pickle works, Gilbert and Young Sts. To exceed $28,000 with equipment. Site acquired.

N. Y., New York—FACTORY—Estate of A. List, 155 East 44th St., bids in March or later, general contract factory, 630 West 52nd St. M. J. McQuillan, 155 East 44th St., archt. Noted Nov. 29.

N. Y., New York—GARAGE—United Bottle Co., 441 East 101st St., bids in January or later on general contract garage, 439 East 101st St. To exceed $28,000. R. Kaplan, 330 West 42nd St., archt. Noted Nov. 29.

N. Y., Niskayuna—BULK STORAGE PLANT—Colonial Beacon Oil Co., Inc., 155 East 44th St., New York, soon lets contract brick, steel bulk storage plant, warehouse, garage, office and pump house, plain found., $85,000. Private plans.

N. C., Ayden—COLD STORAGE, etc.—H. G. Juett, Ayden, plans cold storage and refrigeration. Est. $30,000 or more.

O., Cuyahoga Falls—PLANT—Johnson Steel & Wire Co., Worcester, Mass., J. H. Paterson, genl. mgr., Cuyahoga Falls, purchased building and tract of land at Bailey Rd. and Baltimore & Ohio R.R. and plans erecting new addition and installing equipment for manufacture of steel wire. **Maturity at once.** To exceed $28,500.

Okla., Yukon—FLOUR MILL—T. A. Dobry, 804 Northwest 41st St., Oklahoma City, final plans in progress 1,000 bbl. flour mill. $500,000. Private plans.

Ore., Medford—YARDS, STORAGE—Timber Products Co. plans storage and yards. To exceed $30,000. Fire damage $75,000. Architect not appointed.

Pa., Watsontown—WAREHOUSE, etc.—Ferro Brick, plans 1 story, warehouse and shipping building to replace structure recently destroyed by fire. To exceed $28,500. Architect not appointed.

R. I., East Providence—PLANT—Standard Oil Co., 3360 Pawtucket Ave., East Providence, plans by American Bitumuls Co., lessee, 229 Broadway Pl., Everett, Mass., 1 story, brick, concrete steel asphalt processing plant. Est. about $75,000.

S. C., Spartanburg—STORAGE, etc.—J. O. Erwin, Spartanburg, plans repairing fire damaged storage, loft, distribution and office. Magnolia St. $28,000 or more, with equipment. Architect not appointed. Spartanburg Laundry, Magnolia St., lessee.

Tex., Harlingen—GARAGE, SHOP and SERVICE—Knapp Chevrolet Co., plans garage, shop and service building to replace buildings destroyed by fire. To exceed $28,000 with equipment.

Utah, Spanish Fork—FLOUR MILL—Spanish Fork Business Men, represented by W. A. Simmons, engr., Spanish Fork, sketches constructing 100 bbl. capacity flour mill on old Gem Milling Co. site.

Va., Bristol—POWER PLANT—East Tennessee Light & Power Co., plans repairing steam power plant. To exceed $150,000.

Wyo., Green River—BREWERY—Sweetwater Brewery, Inc., plans enlarging brewery from 20,000 to 50,000 bbl. capacity per year.

B. C., Vancouver—PLANT—Sansan Flooring & Mfg. Co., 1430 Burrard St., plans plant. Est. $50,000.

Ont., Michipicoton — PLANT — Hillside Gold Mines Ltd., Sault Ste. Marie, and Toronto, plans changing over from gasoline equipment to electric equipment, also construct power line. $30,000-$40,000.

Ont., Michipicoten Island—PLANT ELECTRIFICATION—South Shore Gold Mines, D. S. Baird, ch. engr., Wawa Lake, Michipicoten Island, plans electrification of plant and installation of additional equipment.

Ont., Whitby—PLANT—Canadian Boat Industries, J. Beecroft and W. H. Stevens, engrs., plans building and equipping plant, incl. shop for construction power cruisers and yachts, and marine railway. Est. $75,000. Interested in prices of everything.

Que., Joliette—PLANT—Steel Co. of Canada Ltd., preparing plans addition. $70,000. Private plans.

Que., Outremont — PLANT — Kraft-Phenix Cheese Co. Ltd., takes bids this month for new plant. $50,000.

Que., Pointe aux Trembles—OIL REFINERY—Trans-Island Realities Ltd., bids early in January for oil refinery. $250,000.

Que., St. Anne de St. Anselme — POWER GENERATING PLANT—L. Couture, making plans power generating plant on Etchemin River and distribution system in Dorchester County. $150,000 (initial).

Que., Sherbrooke — PLANT — Canadian Silk Products Ltd. plans addition. $60,000

Que., Valleyfield — PLANT — International Bronze Powders Ltd. preparing plans brick, steel addition. $50,000.

Sask., Regina—OIL REFINERY—Co-operative Oil Refineries Assn. plans oil refinery, 300 bbls. per day capacity.

BIDS ASKED

Calif., San Francisco—FACTORY—Geo. W. Caswell Co., 2nd and Harrison Sts., taking bids 4 story, rein.-con., Hawthorne and Harrison Sts. $100,000 or more. Masten & Hurd, 233 Post St., archts.

Ky., Louisville — DISTILLERY — See "Contracts Awarded."

Mo., Kansas City — INDUSTRIAL — Liquid Carbonic Corp., 3100 South Kedzie Ave., Chicago, Ill., bids about Dec. 10, general contract 1 and 2 story, plant and office building addition, 26,000 sq.ft. floor space, 14th St. J. J. Novey, 2434 Ridgeway Ave., Chicago, archt.

N. J., Hackensack—BUS TERMINAL—Garden State Lines, 550 West 167th St., New York, bids about Dec. 15, bus terminal, $90,000. A. E. Dore, 309 Main St., archt. Noted Dec. 13.

N. J., Jersey City—STEAM POWER PLANT—See "Contracts Awarded."

N. Y., Brooklyn—GARAGE, etc.—See "Contracts Awarded."

N. Y., Brooklyn—STORAGE—See "Contracts Awarded."

N. Y., Ridgewood—GARAGE—See "Contracts Awarded."

O., Columbus—WAREHOUSE — Kroger Grocery & Baking Co., 35 East 7th St., Cincinnati, taking bids general and separate contracts 2 story, 120x140 ft., top addition to warehouse. To exceed $28,500.

CONTRACTS AWARDED

Calif., San Jose—SHOP—Hellwig Iron W... 577 West Santa Clara St., 1 story, 50x137½ ... steel, brick shop, Montgomery St., to N. J. N... sen, 1270 Iris Court, cost plus basis. Awar... Nov. 26.

Conn., Hartford—SERVICE STATION—Co... necticut Refining Co., West Haven, 1 story, 25... 45 ft. service station, also three 20,000 g... and three 1,000 gal. steel tanks, to J. Halpr... 40 George St., New Haven. H. S. Cannici, 8... Chapel St., New Haven, engr.

Conn., New Haven—COLD STORAGE—Fa... mont Creamery Co., 46 George St., constructi... cold storage unit and loading platform, ... Dwight Building Co., 67 Church St., $15,50... ***electrical work, to A. A. MacPherson Co... 426 Platt Ave., West Haven***refrigeration, ... Johns Manville, Inc., 60 Wash Manor, West Haven***reinforcing steel, to Truscon Steel Co... 42 Church St., New Haven***structural ste... and iron, to Builders Iron Co., 67 Winthrop Ave., New Haven***shoring, to J. P. Maloney, 1423 North Ave., Bridgeport***plumbing, to Curtis & Pierpont Co., 129 Whalley Ave., New Haven. D. Orr, 956 Chapel St., engr.

Ill., Elgin—PLANT—Illinois Watch Case Co., Dundee Ave., plant addition, to C. E. Giertz & Son, Elgin. Est. $150,000. Noted Nov. 29.

Ind., Richmond—POWER HOUSE—Indiana Gas Utilities Co., boiler house addition, to E. W. Bendfelt, Richmond. Est. $28,500.

Ky., Louisville—WHISKEY WAREHOUSE—Frankfort Distilleries, Columbia Bldg., 4 story, 136x222 ft., rein.-con., hollow tile, Dixie Hy. and 7th Rd., to J. F. Russell & Co., 3908 Frankfort Ave. $175,000. C. J. Epping, 806 East Bway., archt.

Ky., Louisville—DISTILLERY—General Distillery Corp., Frankfort and Melwood Aves., revamping and installing machinery and reworking old brick buildings, day labor. Est. $75,000. W. C. Wagner, Breslin Bldg., archt. and engr.

N. J., Jersey City—STEAM POWER PLANT—Colgate-Palmolive Peet Co., 105 Hudson St., Jersey City, steam power plant, incl. high pressure boilers and equipment, 105 Hudson St., day labor and separate contracts. $500,000. Equipment contracts awarded. Private plans.

N. Y., Brooklyn—GARAGE, etc.—B. Falchi, 1915 58th St., garage, store and apartment, McDonald Ave. and Avenue X, separate contracts. $40,000. C. Van Keuren, 335 East 19th St., archt.

N. Y., Brooklyn—STORAGE—Oak-Cal Realty Co., 233 Oakland St., 2 story, 100x100 ft., brick, Green and Franklin Sts., separate contracts. $30,000 or more. K. McKillop, 771 Manhattan Ave., archts.

N. Y., New York—SERVICE STATION—H. Horowitz, 760 Barry St., service, shop and repair building, 156th and Barry Sts., to J. B. Sully, c/o owner. To exceed $28,000 with equipment. All separate contracts awarded. Noted Nov. 29.

N. Y., New York—STORAGE, etc.—Harsel Realty Co., H. Diamond, pres., 349 East 149th St., 1 story, storage and store, Allerton and Barnes Aves., separate contracts awarded. To exceed $28,000. W. Shary, 22 East 17th St., archt. Noted Nov. 29.

N. Y., Ridgewood—GARAGE, etc.—Philip Dietz Coal Co., 6120 71st Ave., brick, concrete garage, service and shop, separate contracts. $28,000 or more. H. A. Ahrens, Hollis, archt.

O., East Liverpool—KILN—Hall China Co., constructing new circular decorating kiln, 36 ft. long and of tunnel type, to Swindell-Dressler Corp., Aspinwall, Pittsburgh, Pa., $40,000. Private plans.

O., Springfield—PLANT—International Harvester Co. of America, 606 South Michigan Ave., Chicago, Ill., (1st unit) addition, Lagonda Ave., to A. G. Samuelson, 316 South Clairmont Ave. Owner also plans additional units to exceed $30,000 each, bids on next unit after Mar. 1.

Pa., Wellsboro—PLANT—Corning Glass Co., Wellsboro, plant addition, to H. K. Ferguson Co., 25 West 43rd St., New York, and Hanna Bldg., Cleveland, O. Est. $28,000 or more. Contractor awarded separate contracts.

Wis., Green Bay—STORAGE—Atlas Warehouse & Cold Storage Co., 3 story additions to Buildings 7 and 4, to J. C. Basten, Green Bay.

Ont., Hamilton—WAREHOUSE—Steel Co. of Canada, Ltd., Wilcox St., 1 story structural steel frame addition to Warehouse 2 and changing mill, to W. H. Cooper Concrete, 42 James St. N.; structural steel, to Hamilton Bridge Co. Ltd., Hamilton. Est. $125,000. Private plans.

Ont., Toronto — BAKERY — Ideal Bread Co. Ltd., 183 Dovercourt Rd., heating for 1 story, 66 x 90 ft. stable addition, and 93 x 135 ft. brick, steel new plant unit, Greenwood and Felstead Aves., to McNaughton & MacKenzie, 1029 Shaw Ave.***electrical work, to Harris & Marson, 81A Portway Ave.***plumbing, to Sheppard & Abbott, 119 Harbord St.***steel, to Disher Steel Constr. Co. Ltd., 80 Commissioner St.

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†*Federal Government.*